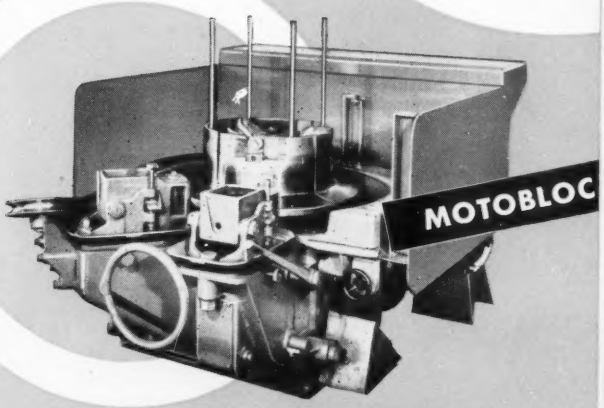
NOVEMBER 1947

WIRE AND WIRE PRODUCTS

RINGBLOX

3 Ways to Profits in wire drawin production



MOTOBLOC

MOTOBLOC, MOTOBLOX, RINGBLOX! Three distinct Vaughn machine types for better wire drawing .. three dependable means of achieving more profitable wire production. Let us consult with you!

MOTOBLOX

The Vaughn Machinery Co., Cuyahoga Falls, Ohio, U.S.A.

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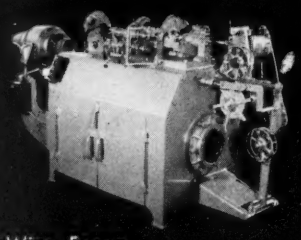
PROFITABLY USED BY LEADING WIRE MILLS SINCE 1871 . . .

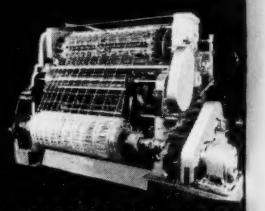
OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

WEAN EQUIPMENT

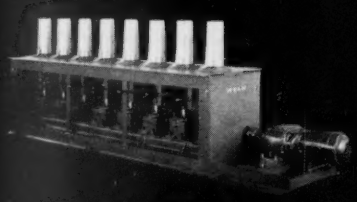
Cleveland Ohio



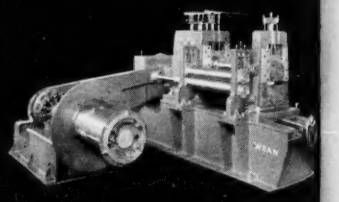
Barbed-Wire Fence Machine



No. 1155 Farm and Field Fence Machine

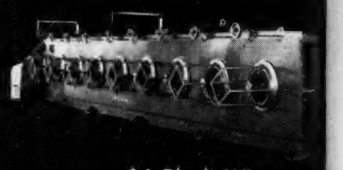


8 Block Fine Wire Tinning Take-up Frame



Strip Reel and Slitting Unit

HOLMQUIST BARBED WIRE AND WIRE FENCE MACHINERY



16 Block Wire Galvanizing Frame

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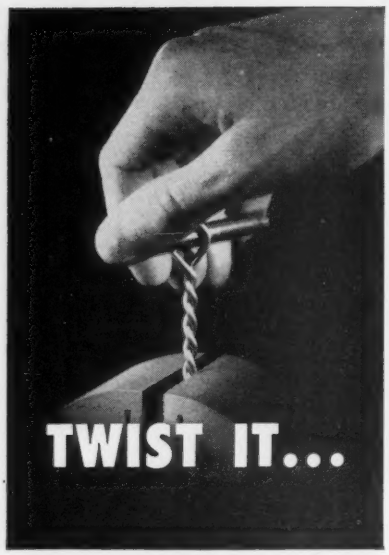

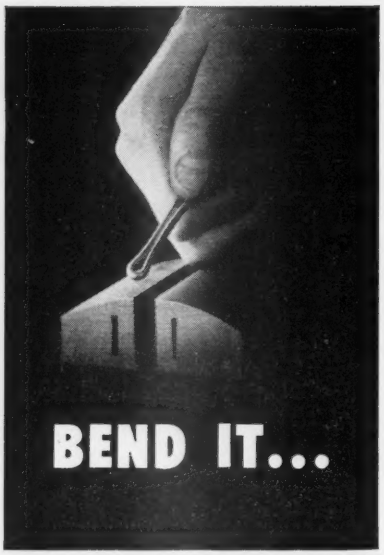

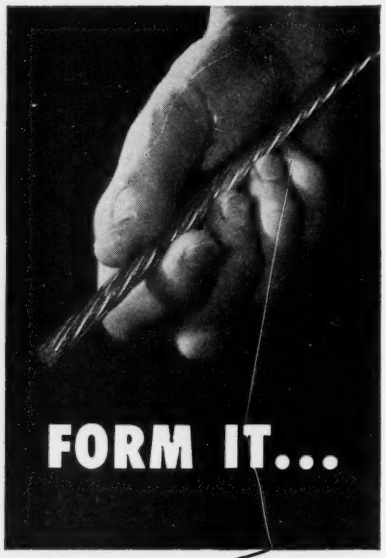

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BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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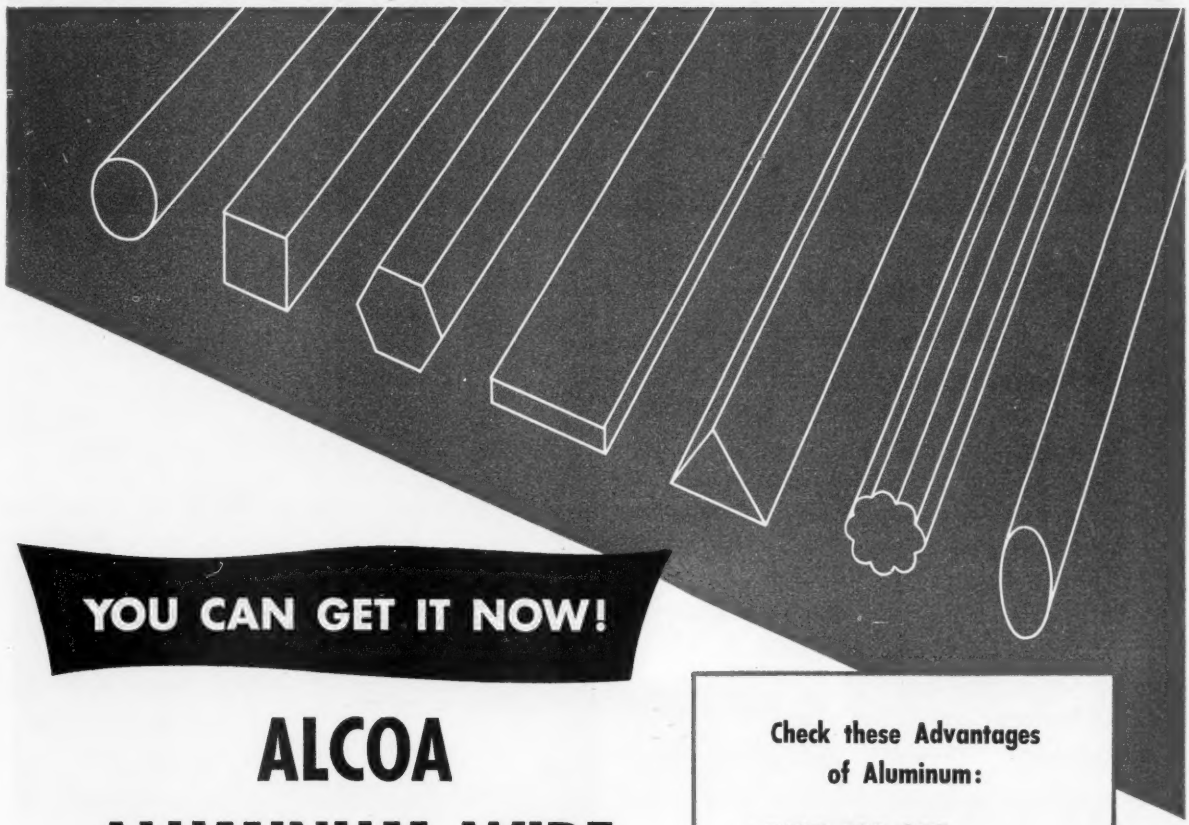
This is a close-up view of the electrolytic cell through which the wire travels. Virgin zinc is electrolyzed from the highly purified bethanizing solution and deposited on the wire surface, perfectly bonded to the steel.

★ Bethanized Wire ★

BETHLEHEM STEEL

WIRE & WIRE PRODUCTS, Vol. 22 No. 11, November, 1947. Publication Office, at 61 Cliff St., New York 7, N. Y. Executive Office, 300 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secy. and Treas. Subscription price: U. S., $5.00; Canada, $5.00 per year; 50 cents per copy; Foreing, $7.50 per year. Entered as second class matter, June 14, 1946, at the Post Office, New York, N. Y., under Act of March 3, 1879.



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IN STANDARD AND SPECIAL SHAPES

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  Three times as many feet of wire in a pound of aluminum as in a pound of bronze, copper, brass, or steel.
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  Costs less per foot than brass, bronze, copper, or stainless steel.
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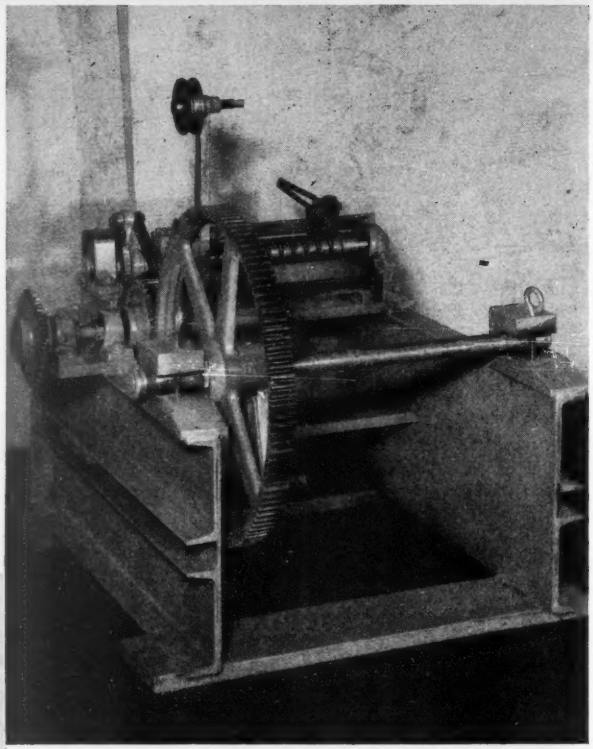

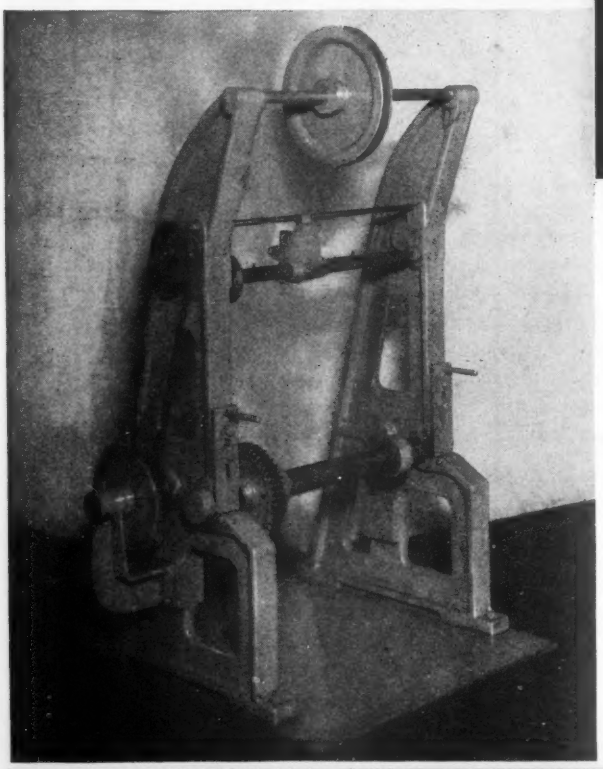

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TANTALUM/TUNGSTEN CARBIDE DIES!

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1. GREATER STRENGTH: Tapered nib design increases absorption of drawing stresses. Side walls of nib are taper-gripped resulting in tremendous die strength.

4. CONCENTRICITY: V-R method of precision die manufacturing assures you of a perfect, concentric drawing surface.

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5. FREE OF POROSITY: Another outstanding achievement is the V-R die quality control for the elimination of porosity in carbide. In addition, V-R Tantalum/Tungsten carbide die nibs take a higher finish than any other die material.

3. MAXIMUM VISIBILITY: Extra wide tapered front and back openings permit simple, easy inspection, better lubrication.

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Comparative performance, in addition to exhaustive laboratory tests and wide spread, practical field applications, place V-R carbides at the forefront of carbide die design and development.

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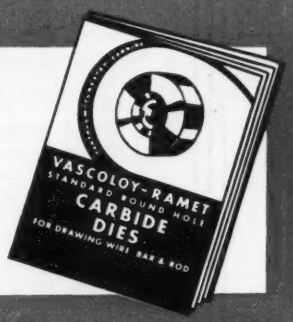

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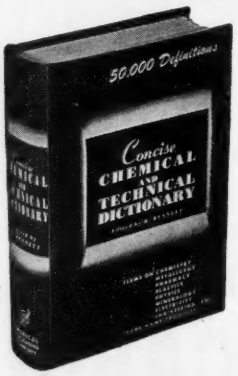

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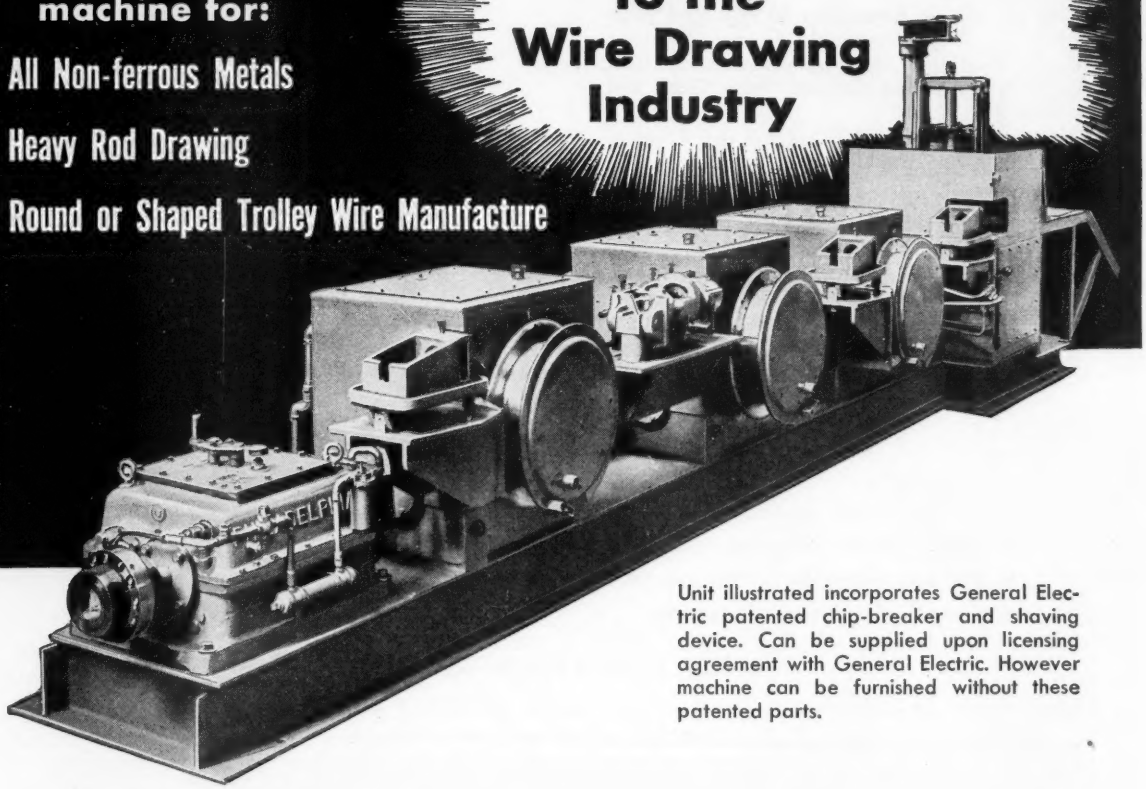

Unit illustrated incorporates General Electric patented chip-breaker and shaving device. Can be supplied upon licensing agreement with General Electric. However machine can be furnished without these patented parts.

TROLLROD has capacity to enter up to 1″ copper. All blocks include heavy duty cone type worm drives.

Total machine capacities can be furnished up to 300 h. p.

Syncro can furnish the TROLLROD machine to meet your special needs as follows:

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Cadmium, Nickel Silver (10%, 18%, 30%), Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

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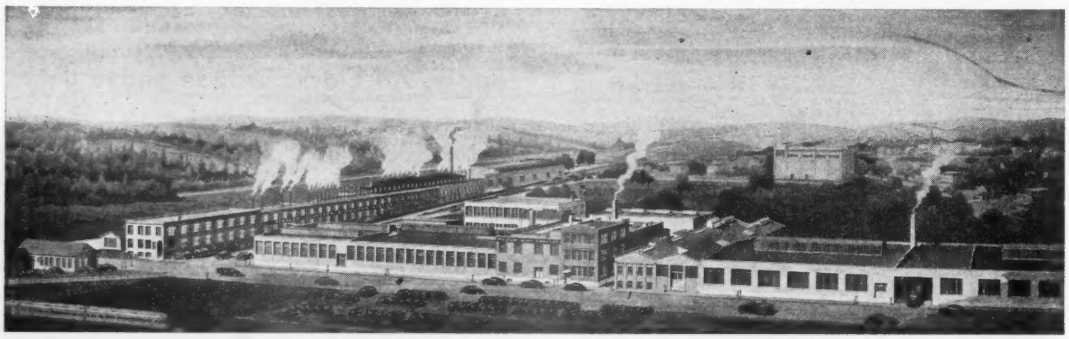

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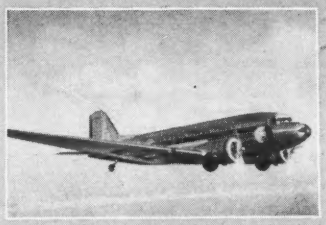

WHATEVER THE USES

to which the wires you are drawing are to be put, *lubrication approximating perfection* is the goal we seek.

To achieve this end we make as careful study of the many possible uses to which your product is to be directed as we do to the analysis of the materials used.

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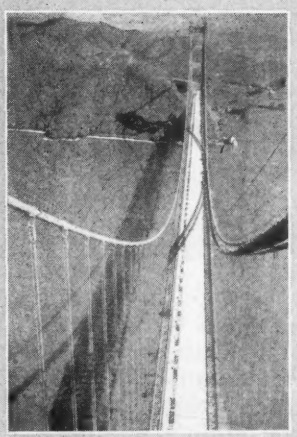

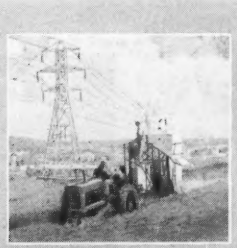

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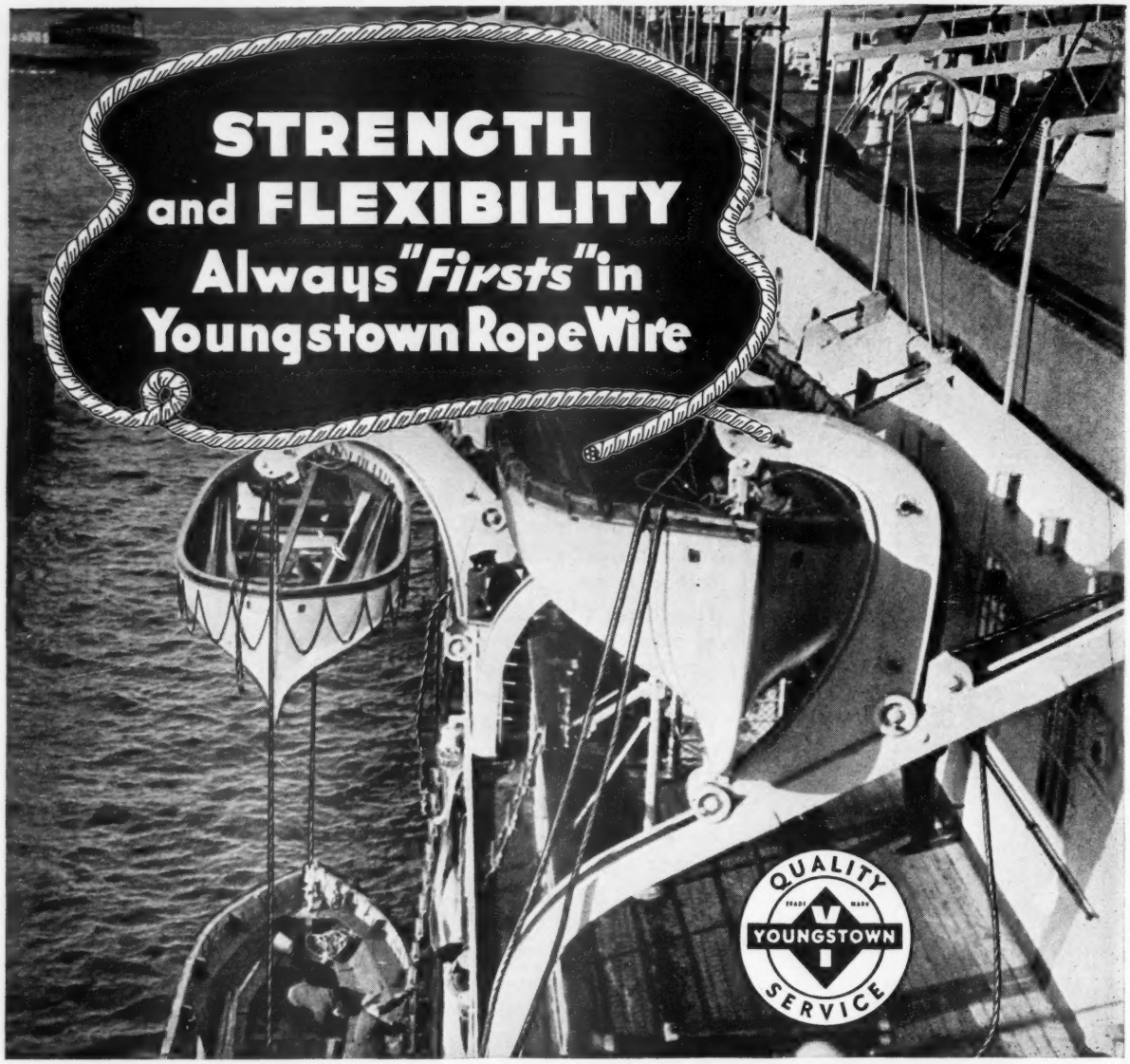

As lifeboats are manned

LIVES depend on wire rope when a crisis comes at sea and lifeboats are lowered. Ropes must run fast over sheaves--smoothly, surely, with no possibility of a jam. Strength and flexibility are "firsts."

Wire rope can be no better than the wire from which it is woven. Quality in the wire must start in the steel. Rope woven from Yolectro High Carbon Rope Wire can be dependably strong and flexible, because strength and flexibility are built into it--guarded at every step of production, from the charging of the open hearth to the final inspections.

So specify Yolectro Rope Wire to measure up in strength and flexibility. It runs uniform in gauge, has toughness to resist abrasion, has properties to resist corrosion. Yolectro High Carbon Rope Wire, like all other Youngstown wire mill products, is of finest quality steel, refined, rolled and drawn to exacting specifications.

Photo—Courtesy Preformed Wire Rope Information Bureau.

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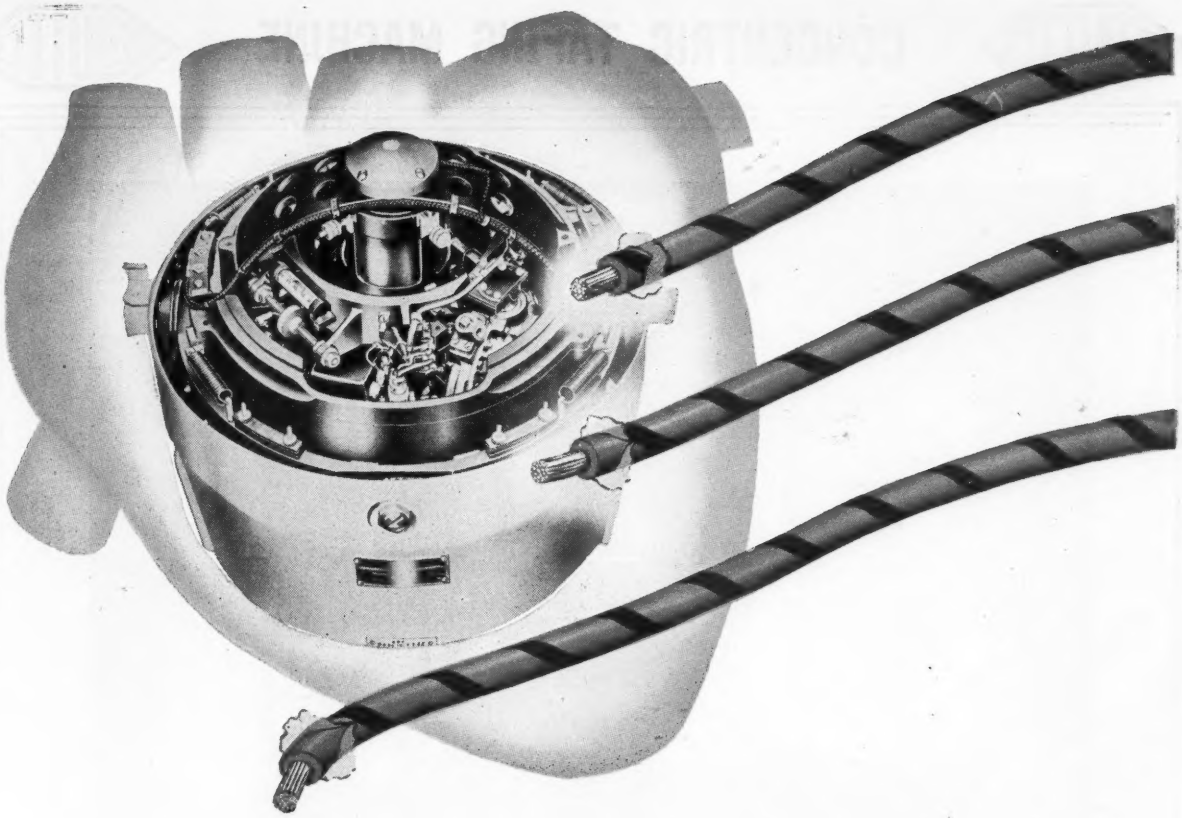

ARTERIES FOR A SHIP'S HEART GET PROTECTION WITH DU PONT NYLON

In wiring for the Arma gyro compass, tough, long-lasting nylon jacketing resists heat, oils, abrasion, and flexing

The heart of a modern ship is the gyro compass—which tells the navigators what course they're on.

Arma Corporation of Brooklyn, N. Y., makes gyro compasses for the Navy. Naturally, they make them with the best materials obtainable. And that's why they're using connective wiring jacketed with Du Pont nylon.

Arma says that before adopting this wire jacketed with nylon they tested wire with many and various jacketing materials. None before nylon met the rigid specifications. None sufficiently withstood lubricating oils, heat and hard mechanical abuse.

Nylon-jacketed wire not only meets every one of the specifications, but a much thinner jacket is required than with previous jacketing materials, and thus space is saved.

Surprenant Manufacturing Company of Boston, manufacturer of the wire, has this to say: "As an extrusion jacket of protective covering on wire, nylon is unsurpassed in present-day thin-wall extrusion. The abrasion resistance of nylon is greater than that of any existing material used in a like manner. Nylon has a 'slick' surface that allows easy movement through narrow apertures. In addition it has the desirable properties of very high tensile strength and great extensibility. Compression strength, necessary especially in a protective covering, is more than adequate. To these properties can be added the more apparent features of ease of extrusion with proper controls and ability to color in delicate shades when required."

When you think of jacketing for wire and cable, think of Du Pont nylon. It is tough and abrasion-resistant, able to stand flexing and rubbing over extended periods. It can resist heat, oils, many chemicals, salt water and fresh water, and aging. Write us *today* for more information. E. I. du Pont de Nemours & Co. (Inc.), Plastics Department, Room 1511, Arlington, New Jersey.

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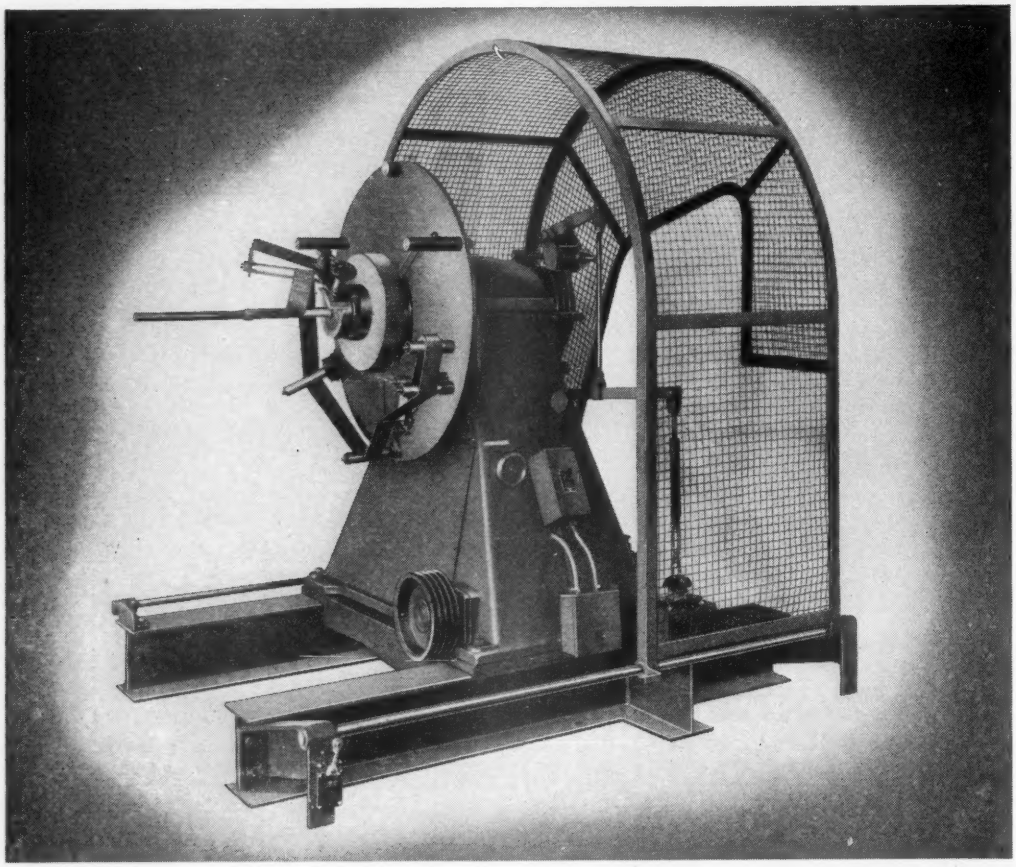
CONCENTRIC TAPING MACHINE



The unit illustrated is a concentric type taping head designed to apply paper, cambric, friction, natural or synthetic rubber tapes on electric cables.

The unit will handle packages up to 24-inch diameter by 4-inch width.

Heads are provided with electrically operated stop motions, interlocking guards, electrically operated brakes, automatic tension control, and variable speed drive.

These machines can be furnished in single units to be used in conjunction with stranding and other machines, or as multiple head units complete with motor drive, capstan and take-up.

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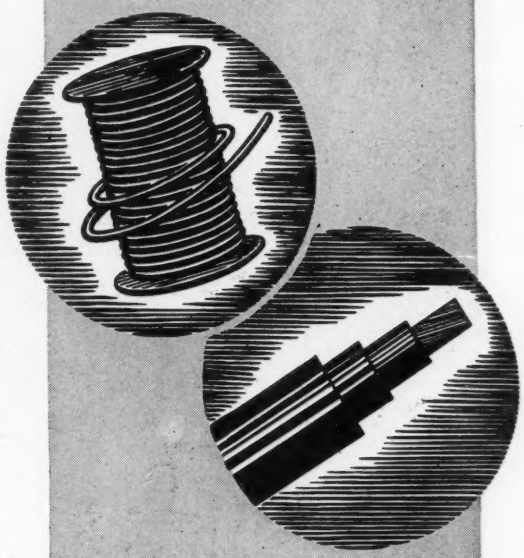

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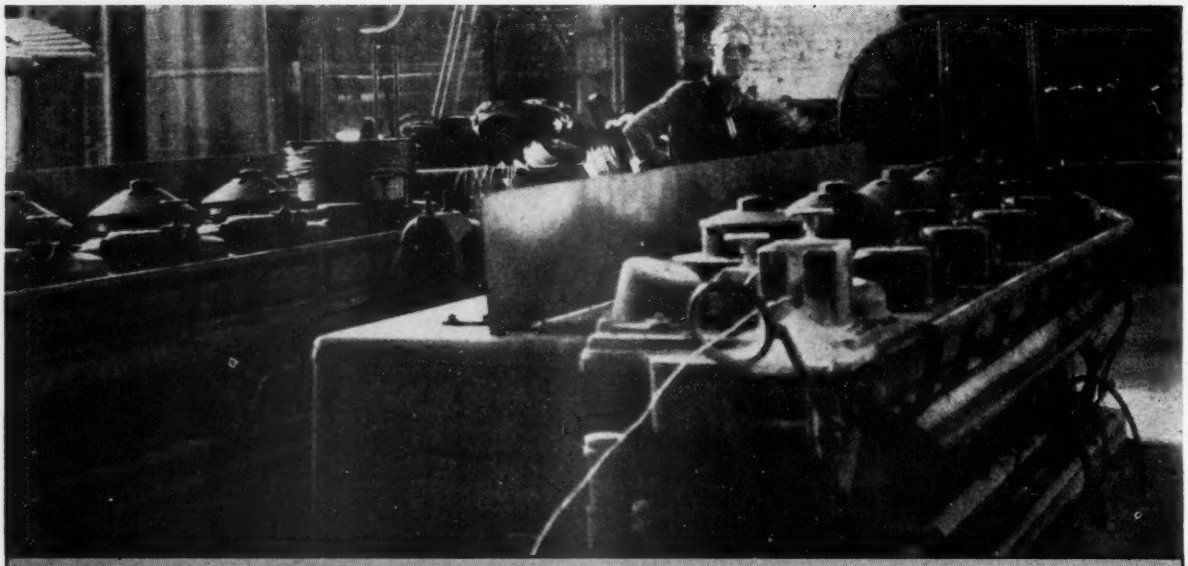

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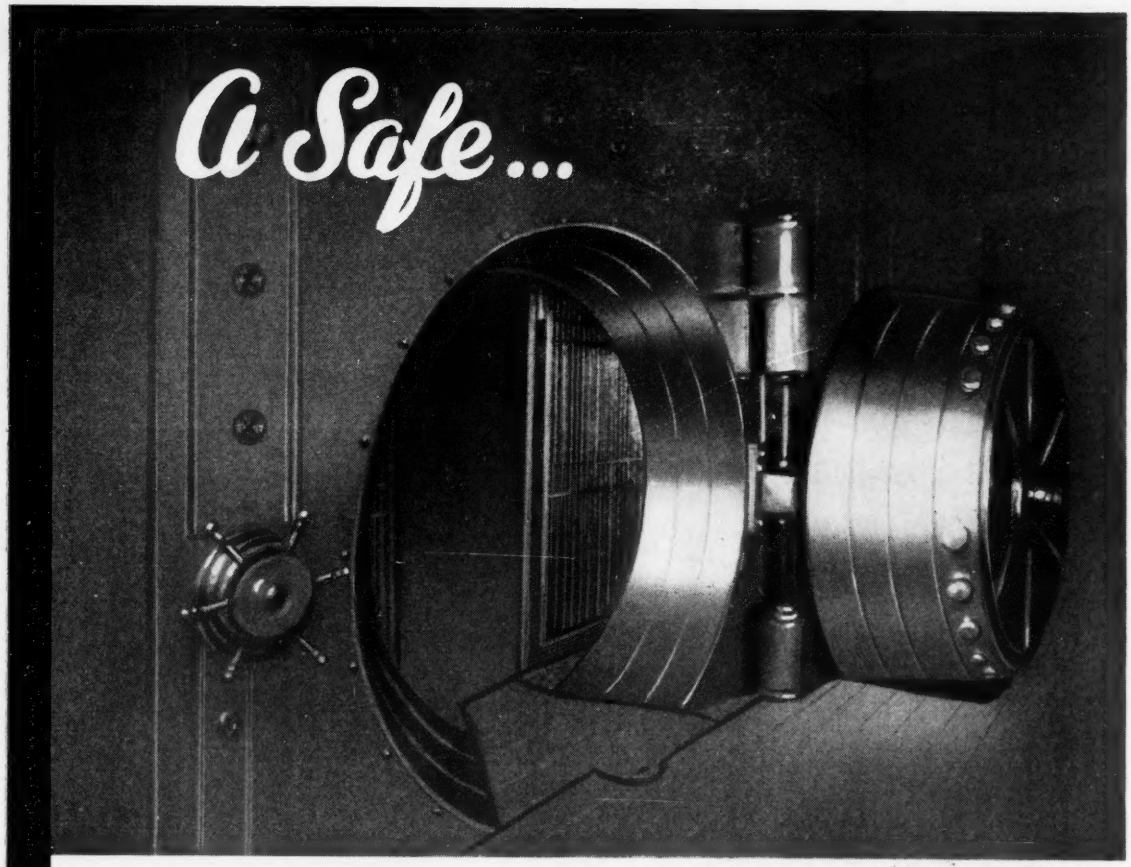

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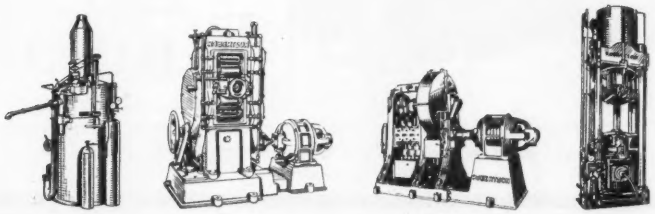

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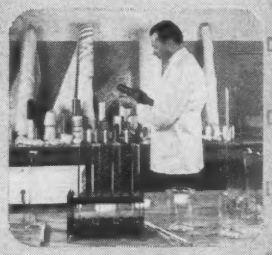

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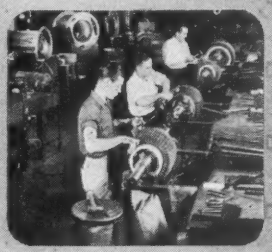

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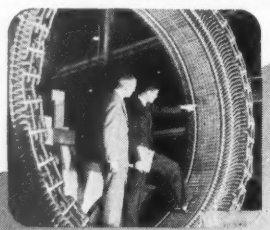

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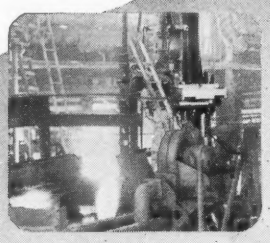

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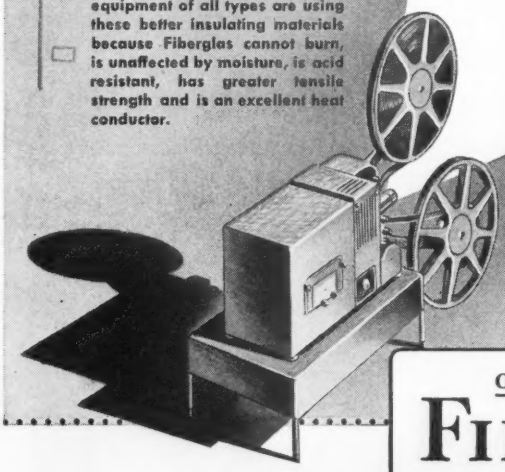

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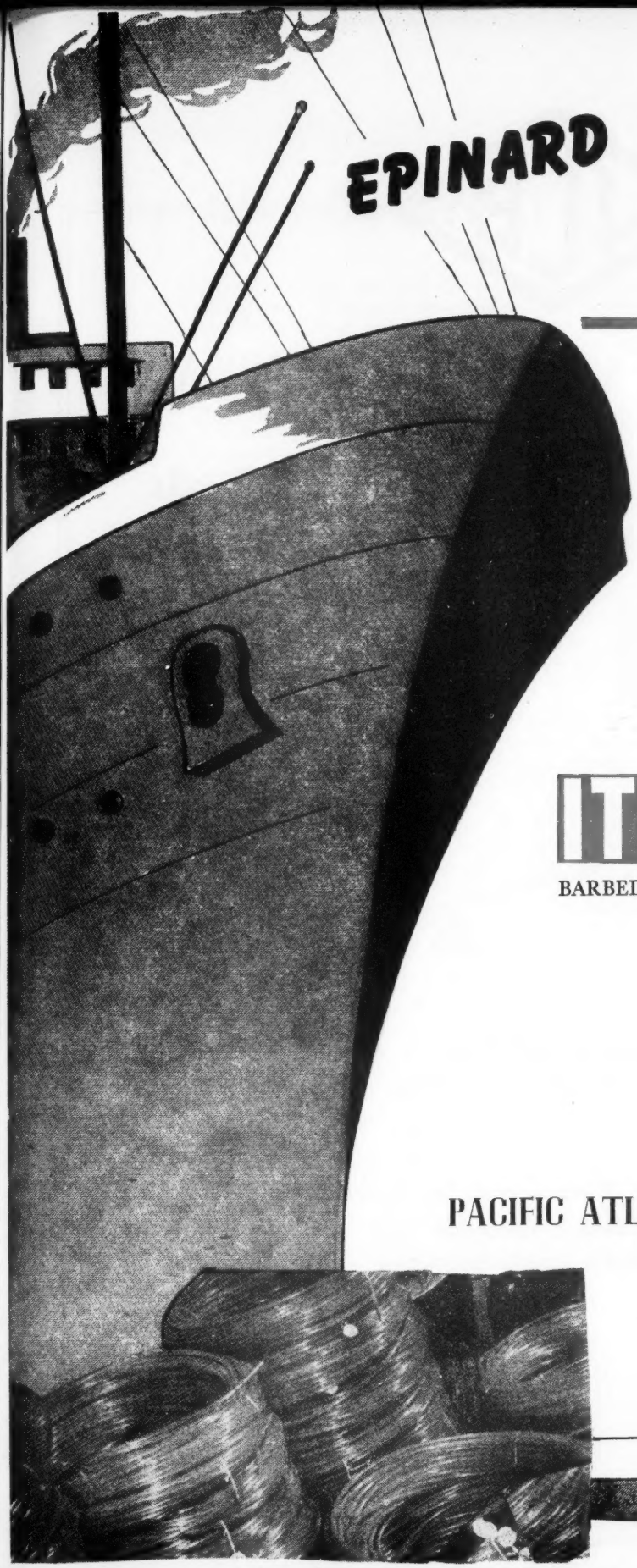

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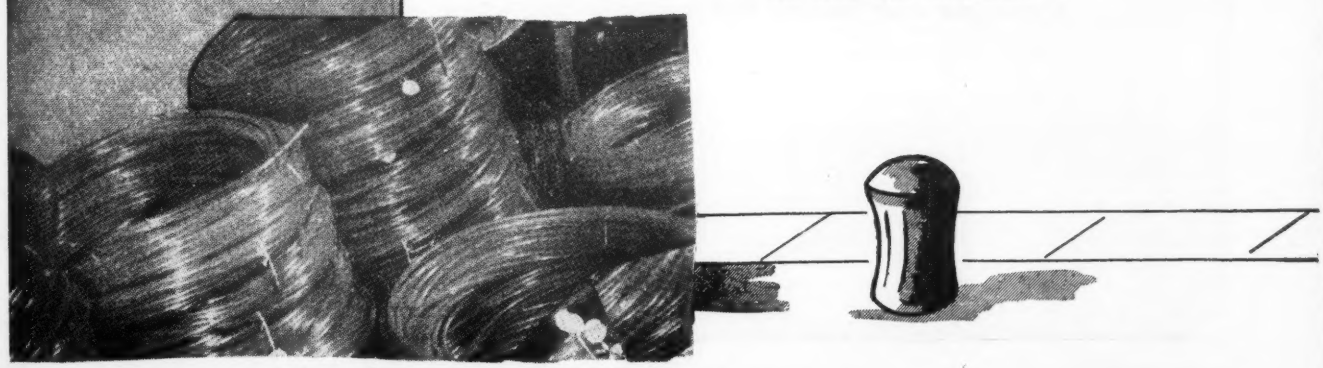

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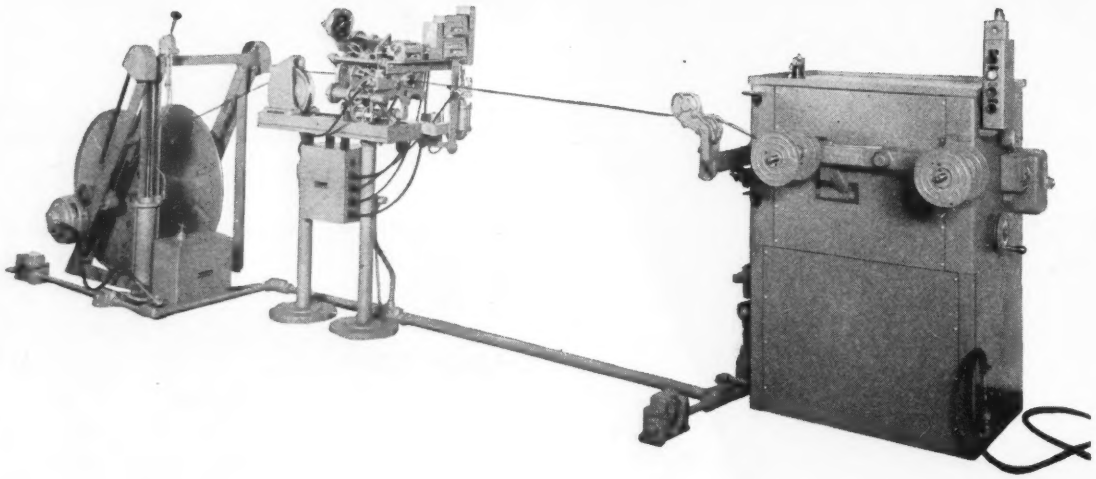

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The Wire Outlook

A hungry Europe requires food. Industrial Europe needs rehabilitation. It is proposed that we pour more goods and supplies into this bottomless pit in the hope of "saving democracy". Apart from the humanitarian aspect of it, there is a very real question as to whether the further depletion of our dwindling resources will not defeat our very objectives and thus, theirs, if in the process we ruin our own economy. Of one thing we may be sure, it will be a thankless and unappreciated effort. But should we weaken our own economy, now at the breaking point, we shall have failed. Any proposal to bleed ourselves white with no assurance that the long-range objective of building free, competitive world markets is a matter to be approached with prayerful and thoughtful consideration.

Export markets based on business transactions are even now dwindling to the vanishing point—most foreign buyers have nothing with which to pay for what they want. Exports are of no value to us unless in return we can get something useful and tangible. Europe's dollar supply will be exhausted by the end of the year, unless we provide more dollars—which is robbing Peter to pay Paul.

Rising prices is our bugbear. Government support of agricultural prices and its large and proposed larger purchases of all kinds of goods will keep prices spiraling and vitiate our efforts to be of assistance abroad, while adding to hardships at home. We poured $64,000,000,000 into various parts of the world to "save democracy". Will a mere $20,000,000,000 turn the tables? It is beginning to look doubtful and economically impossible.

Heavy exports, strikes, extraordinary demand and lack of transportation facilities have delayed the day of balance between steel supply and demand for another year—some steel men think two, unless a recession cuts the demand back sharply. Steel companies are spending a billion dollars to increase the annual output by 2,500,000 tons. Even this will hardly be a drop in the bucket for present needs.

Machinery and equipment people for the wire industry are finding their backlogs are growing steadily. This is not due to expanded wire mill facilities so much as the replacement of old equipment with modern, faster and better production units to offset rising labor costs. Machinery manufacturers suffer from a shortage of steel themselves, hindering the wearing down of backlogs. One big equipment concern is operating at two-thirds of capacity for lack of steel, yet is turning out 100% more than in its best pre-war year. It is the mass accumulation of expanded capacity that keeps metals in short supply and yet, with greater than ever production, demand cannot be met promptly.

The outlook for sustained high production of steel is favorable. That means that rods will be coming through as well or better than before, though still giving trouble. Demand for welding rods has perked up, as well as for steel wool and upholstery wire. Nail demand is heavy and stocks are depleted, but this will taper off in the Fall. Nail production schedules have already been cut. Music wire is in better supply than heretofore. Spring wire demand has eased. Bale ties and heavy fencing are very short in supply. Deliveries of steel to fastener manufacturers have improved somewhat, but the heavy demand for small sizes, keeps supply at this end of the business stringent. The coming of colder weather is expected to lessen the demand for wire for farm products, which should be reflected in a better supply of rod and wire for other uses. Wire rope demand is fairly well sustained, but lower than a year ago.

Wire mill demand for copper is maintaining a high level, but brass mill needs are at a low ebb. The overall demand for copper keeps the supply somewhat behind requirements. Some wire and cable manufacturers have lengthened their delivery dates due to shortages of other materials.

Tungsten will be shorter in supply and prices higher this Winter due to heavy Russian purchases of tungsten ore in world markets.

While to the many faceted questions before us answers must be found, and will be, there should be no let-down in efforts to produce all along the line. Greater production, especially efficiency in production, will solve many problems. Right now we are in a "keep on keeping on" stage in our history, with one thing to be emphasized —in the keeping on, let us do it ever better.

—from the Editor's Desk

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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 22 NOVEMBER, 1947 No. 11

Designated as
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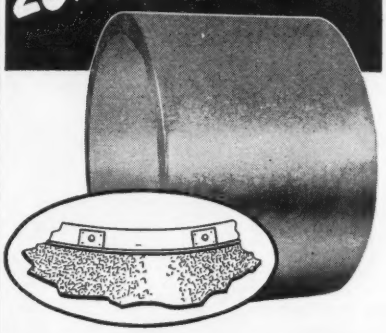

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Vol. 22 NOVEMBER, 1947 No. 11

Salt Bath Annealing Proves Fast and Versatile

by E. L. McReynolds, Metallurgist
Morse Chain Company Division
Borg-Warner Corporation
Ithaca, New York

The advantages of Salt Bath Annealing for both small cold drawn and cold rolling mills is described here.

ANNEALING of alloy steel in many instances means annealing cycles of long duration, usually in the range of 4 to 30 hours, depending of course on type of steel, weight of charge, and hardness and structure desired. It is quite advantageous for a comparatively small cold drawing and cold rolling mill, producing each month as many as 100 different odd-shape sections in coils, to anneal in the shortest time possible. A recently installed Ajax-Hultgren electric salt bath annealing furnace at the **Morse Chain Co., Div. of Borg-Warner Corp.,** Ithaca, N. Y., meets this requirement.

* * *

THE furnace is a 175 KW unit, internally heated by immersed electrodes, with two transformers, one 70 KW and the other 105 KW. Power is 460 Volts, 60 cycles, 3 phase, with a normal (full load) operating current of 93 amperes on the 70 KW transformer and 139 amperes on the 105 KW transformer. On starting up, the conductivity of the bath increases with the rise of bath temperature, with a corresponding rise in current input. There are several primary taps to the transformer which vary the stepped-down line voltage from approximately 9 to 16 volts. As the temperature and current input rise, the current input is controlled by setting the transformer switch on successively lower voltage taps. There are 5 pairs of closely-spaced electrodes made of heat-resisting alloy. All electrodes are located at one end of the furnace.

* * *

THE rectangular, salt-containing pot, with inside dimensions of 60″ x 57″ x 60″ deep, is made of steel and is thoroughly insulated. Surface radiation losses are minimized by an insulated cover mounted on flanged wheels which run on steel tracks. A motorized, chain-driven mechanism rolls the cover forward or backward to permit loading and unloading. The pot is charged with 13,000 lbs. of neutral salt which, in this case, consists of approximately 50% sodium carbonate and 50% potassium chloride having a melting point of about 1070 degrees F. Normal depth of salt is 54″. A maximum operating temperature of 1300 degrees F is recommended for such an installation and thus far all of our annealing has been done at this temperature.

* * *

ADMITTEDLY, the types of steel handled fall in the easily annealed class, and the annealing for the most part is simple process annealing. Carburizing grades of alloy steel, such as 8612, 8620, 3112 and 2320, are annealed at 1300 degrees F. between cold drawing and cold rolling passes to uniformly low hardness. Hot rolled 9445 and 6140 steel in coils have been annealed at 1300 degrees F. very satisfactorily for cold drawing with a reduction of 1/32″ and subsequent cold forming into roller chain pins. Time in the salt varies from 30 minutes to 1½ hrs., with the smaller, heavily worked sections requiring the least time. The practice on smaller sections is to hold the charge in the bath only until the controlling thermocouple recovers to the operating temperature of 1300 degrees F. The furnace is also used for annealing of parts blanked from cold rolled 1050 and 3140 steels, reducing the hardness to facilitate subsequent cold forming operations, including right-angle bending. These parts are submerged in the molten salt in 7″ diam. baskets. The cooling of all material is in air, the steel being removed from the bath at 1300 degrees F. A tightly adhering salt film prevents scale formation.

* * *

FIG. 1 shows in actual size a few of the cold finished sections made from hot rolled rounds or flats. Some of the sections require as many as 10 successive cold drawing or cold rolling operations, usually with an anneal between each operation. With the uniformly low

hardness resulting from salt bath annealing, it has been possible in some instances to perform two cold working operations without an intermittent anneal. The thickness of the smallest section made is .0265″, and the size tolerance on all is held as close as can usually be had with machining or grinding operations. A tolerance of ± .00025″ is required on many of the finished sections, and of course properly annealed and cleaned stock is a necessity to uninterrupted operation. All cold finished sections go on to further manufacturing processes, some to simple cut-off operations and others to severe forming on intricate machines. In the latter, hardness and size tolerance play a vital part as to whether the operation proceeds smoothly and on schedule. Table No. 1 shows hardness on several items before and after annealing at 1300 degrees F., followed by air cooling:

* * *

THE weight of each furnace charge is 900 to 1200 lbs. supported on one yoke bar. Charging is done by overhead crane. All parts of the supporting yoke are made of low carbon steel. Indications are that such a yoke has a life in excess of 250 furnace charges. The top bar of the yoke is 2¾″ rd. and is easier to locate in the support slots in the furnace walls than is a square bar. The bottom bar on which the coils rest is 2½″ square, with 15″ wide ⅜″ thick plates welded on top and bottom. These plates are curved to meet at the edges, where they are welded, and prevent excessive sagging and distortion of coils. This coil support gradually sags with continued use, but may be frequently turned 180 degrees to prolong it's life. Fig. 2 shows the furnace with an average size charge.

* * *

WITH a thermocouple temperature of 1300 degrees F., the average charge drops the temperature to around 1270 degrees F., and recovery to 1300 degrees F. requires approximately 30 minutes. Only one thermocouple is used and this is located midway of the 5 in. space between the electrodes and the end of the furnace. Submersion depth of the thermocouple junction is 24 inches.

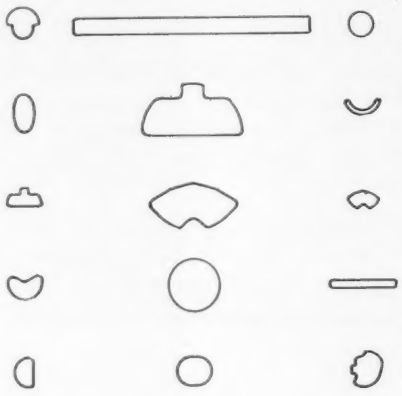

Fig. 1. — Actual Size of Cold Finished Sections Made From Hot Rolled Rounds or Flats. *

* * *

AS the salt is a conductor of electricity, a movement or flow is set up in the salt in the magnetic field between the closely-spaced electrodes. This circulating movement of salt is downward between the electrodes, is rapid enough to prevent localized overheating at the electrodes, and transfers heat uniformly to all points in the bath. Temperature variations in the furnace were only 15 degrees F. after a charge had been in for 30 minutes, the temperature near the electrodes being 1300 degrees F. and 1285 degrees F. at the work. With continued holding time this variation would probably be narrowed.

* * *

THE salt is quite fluid at 1300 degrees F. and drag-out is low. Average salt additions are 300 to 400 lbs. per week of 60 to 75 annealing charges. The furnace has been in operation for about 8 months with no sign of pot deterioration. The salt has never been allowed to freeze, and the furnace is idled at 1200 degrees F. over week-ends.

* * *

FACILITIES are not yet available for water quenching the work while hot. The present cooling to room temperature and soaking in a hot water tub to remove the salt requires 2 or 3 hours. Satisfactory results should be obtained by quenching the work while still quite hot, thus saving time in cooling and also cracking loose most of the salt. Final cleaning of all salt requires about 15 minutes in a 4 to 6% sulphuric acid pickling bath. Here also the steel surface is slightly etched for better adherence of lime and the other lubricants used in cold drawing.

* * *

THE furnace is remarkably simple to operate, with very close control of temperature, and working conditions for the operators are good. Salt bath annealing appears to be particularly well adapted to the process annealing of coiled small sections. The milder, medium-carbon alloy steels are softened

(*Please turn to page* 916)

TABLE NO. 1

Item Annealed	ROCKWELL HARDNESS BEFORE ANNEALING	ROCKWELL HARDNESS AFTER 1 HR. IN SALT AT 1300 DEGREES F. COOLED IN AIR
13/32″ Rd. Hot Rolled A-6140	RC 25-27	RC 15-18
3/8″ Rd. Hot Rolled NE-9445	RC 28-33	RC 12-14
Flat .125 Thick Cold Rolled A-3140	RB 99-103	RB 85-90
3/8″ Rd. Cold Drawn A-2317	RB 92-96	RB 85-86
.230″ Rd. Cold Drawn A-8620	RB 103	RB 80-82
.230″ Rd. Cold Drawn A-8612	RB 97-98	RB 76-77
.160″ Rd. Cold Drawn A-8612	RB 92-93	RB 68-72

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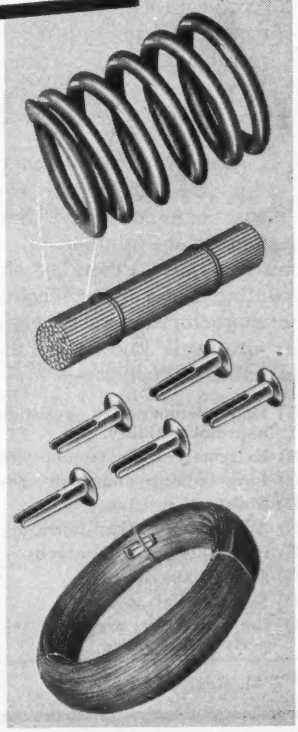

SPRING WIRE ARC WELDING WIRE FORMING WIRE LOCK WASHER WIRE
CHAIN WIRE TUBULAR AND BIFURCATED RIVET WIRE
WOOD SCREW AND MACHINE SCREW WIRE GALVANIZED WIRE

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

New Developments in Wire and Cable Applications of Fiberglas* Materials

by Fred F. Sampson, Manager
Wire & Cable Sales Electrical Division
Owens-Corning Fiberglas Corp.,
Toledo, Ohio

THE wire and cable industry, in the period following the war, found itself involved in serious shortages of insulating and other materials, resulting in widespread substitutions and an all-out effort to increase production to meet the pent-up peacetime demand. Increased raw material prices were considered a secondary matter compared to the problems involved in obtaining sufficient quantities of the materials.

* * *

RECENT months have seen an end to this situation for many products manufactured by the industry, particularly in such products as building wire and cable. Emphasis has accordingly shifted from the struggle to procure sufficient materials to tighter control of raw material inventories, close scrutiny of raw material prices, search for less costly substitutes of equivalent performance, and investigation of all possible manufacturing economies.

* * *

AN interesting development during this period of reversion to "cost consciousness" has been the increasing number of applications in which **Fiberglas** electrical insulating materials are being used. The characteristics of **Fiberglas** textiles are well known to the wire and cable industry:

A) High temperature resistance and noncombustibility.
B) Extremely high tensile strength.
C) Low buildup and high coverage.
D) Moisture resistance.
E) Acid and oil resistance.
F) High thermal conductivity.
G) Permanence.
H) Dimensional stability.
I) Good electrical properties when properly impregnated.
J) Abrasion resistance satisfactory for service requirements when properly impregnated.

* T. M. Reg. U. S. Pat. Off.

* * *

HERETOFORE alert engineering and production men have taken advantage of those characteristics to provide electrical devices that stand up well under adverse operating conditions and provide an extra safety factor. Performance advantages of such equipment, however, have generally been available only at increased cost unless some corollary savings developed. Now Fiberglas electrical insulating materials are being used on many wires and cables at lower cost than organic textiles and are imparting equivalent or improved performance characteristics to the end product. This program resulted from the development of yarns in the Fiberglas 150's series—that is, yarn fabricated of glass filaments of controlled diameter sizes larger than those previously used. Increased production rates made possible significant price reduction, which was announced to the trade on March 1, 1947.

* * *

SOME new applications are now established as standard production items; others are still in the development stage.

* * *

Outer covering of nonmetallic-sheathed building cable

FIRST application of Fiberglas yarn for this purpose was made in the autumn of 1946. Since then many manufacturers have adopted Fiberglas yarn as their standard textile for the outer braid of building cable. The material cost of Fiberglas yarn is substantially lower than the cost of an organic braid. Manufacturing economies also result from improved braiding efficiency, savings in amount of compound used for impregnation, and savings in handling a lighter weight cable. A permanent inorganic cable jacket is provided. As with most new developments, some difficulties had to be overcome. In this case a problem existed in obtaining sufficient compound-to-Fiberglas adhesion to resist flaking away of the finisher upon bending the cable at low temperature. Use of proper saturants and finishers applied with more controlled technique has supplied the answer to that problem. Some manufacturers have adopted a combination of cotton and glass yarn for the jacket.

* * *

Binder yarn for rubber-covered wire of wrapped or served construction

THE first application of Fiberglas yarn for this purpose was made in 1946 and, as in the case of the building cable jacket, it has since been adopted as standard by many manufacturers. The yarn is particularly adaptable to this use as it offers an extremely low cost per unit length of yarn per pound of tensile strength and provides a more permanent binding yarn.

* * *

Dyed Fiberglas marker yarn

THIS is now a standard component of many wires and cables. High strength, low cost, small size, resistance to heat and moisture; all these properties have played a part in identification yarn usage.

* * *

Magnet Wire

WORK on magnet wire with the 150's series of Fiberglas yarn includes the replacement of the finer-fibered Fiberglas yarn on glass-

covered wire and also the replacement of the under cotton serve on double cotton covered wire. The use of heavier yarn is possible because the very low twist (one turn per inch of yarn) permits the yarn to spread well on the wire and to give good coverage with essentially the same buildup as finer-fibered Fiberglas yarns. The result is a substantial saving in the material cost of Fiberglas on the glass-covered wire. Replacement of the under cotton serve makes possible a lower cost covering, again due to the spreading characteristic of Fiberglas 150's

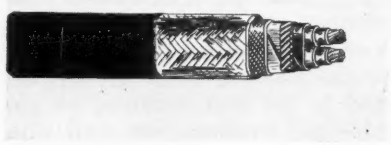

Fig. 1. — Service entrance cable — Fiberglas outer braid covering. * * * *

yarn. In addition, it is expected that the composite covered wire will have somewhat thinner buildup and the Fiberglas inner covering will provide an extra safety factor. No varnish is applied to the wire because the outer cotton serving provides the required abrasion resistance. Installations of the wire now being made will provide data on

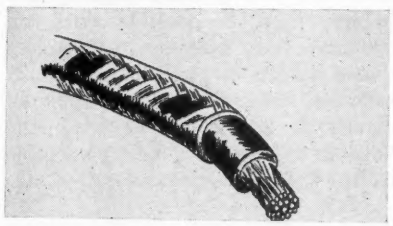

Fig. 4. — Radio Hook-up wire — Fiberglas braid with Fiberglas dyed yarn circuit identification.

handling and performance characteristics.

* * *

Large Size Code Wire

A similar under serve application has been developed for the larger size rubber-covered wires, where two textile coverings are required. The under covering may be a rubberized cotton tape, cotton yarn braid or cotton wrap. One of the manufacturers of single conductor building wire has now obtained approval of a construction in which a Fiberglas yarn wrap replaces the under cotton yarn wrap. Such a construction is lower in cost than that employing the under cotton wrap, and yet provides a permanent inorganic component in the insulated wire. Fiberglas yarn is applicable for the same reason for the under covering where a conventional braid is used.

* * *

Under Wraps

SEVERAL other applications are now under consideration, where lowered cost and improved per-

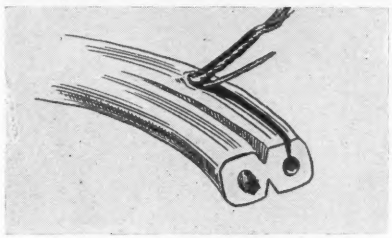

Fig. 2. — Fixture wire — Fiberglas dyed yarn company marker. * * * *

formance result from the use of an under covering of Fiberglas yarn. Several manufacturers are now testing construction of annunciator wire of an inner Fiberglas yarn wrap and an outer cotton yarn wrap.

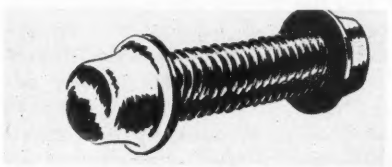

Fig. 5. — Resistor — Fiberglas cord used for core.

Communication wires now employing rayon underserves have been made with Fiberglas yarn underserve and are now under test for relative performance.

* * *

Tension Member

THE use of Fiberglas cord as tension member in flexible cords has become standard with several manufacturers for such products as miners' lamp cord and geophysical cable. Because of the price reduction in 150's series yarns, interest in their use as tension members has definitely increased. The principle interest for this application, as in binder yarn applications, is in the extremely low cost per unit length of yarn per pound of tensile strength with minimum space occupancy. The yarn is a natural complementary material for certain film-jacketed cables, providing the necessary strength and yet permitting minimum overall cable size. For some time resistors have been manufactured with Fiberglas cordage as the core material. A further step is the current experimental work being carried out with Fiberglas yarns as the core for heating elements to be used on such products as electrically heated blankets. High

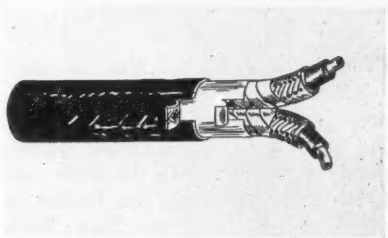

Fig. 3. — Building cable — Fiberglas binder yarn for Peterson braid. * * * *

strength, low cost, heat and moisture resistance, and permanence are the characteristics that prompt this work.

* * *

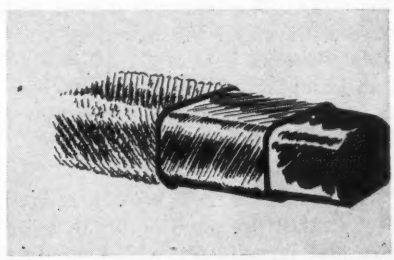

Fig. 6. — Double covered magnet wire — Fiberglas yarn underserve — cotton yarn outerserve. * *

Service Entrance Cable

FOLLOWING the use of Fiberglas yarn in the outer covering of nonmetallic-sheathed building cable, experimental runs are now in progress using the yarn for the outer braid of service entrance cable. Resistance of the inorganic yarn to breakdown under weathering conditions will be of particular interest here. Manufacturing and material economies should result.

* * *

(*Please turn to page* 907)

Wire Braiding and Precision Wire Braiding

by G. Wightman,

Technical Representative
B. F. Carter Co., Ltd.,
Albion Works,
Bolton, England

THE last few years have seen great developments in all types of electrical cables and high pressure tubing, where it has been necessary to braid with wire of various tensile strength, and the number of ends always altering in accordance with the product required.

* * *

IT will be observed that to wire braid, cables, rubber hose, high pressure tubes etc., the winding of the wires on to the braider bobbin must be perfect, with the ends side by side, so that they can be fed to the braiding point in tape form. To enable this winding operation to be performed, we have been manufacturing for some years the **"Bolton"** Universal Single Bobbin Wire Winding Machine, for single or multiple ends up parallel, in high tensile hard steel, copper, brass or aluminum wire, a close up of the machine is illustrated on Photoprint No. 214A. The compact design and ease with which the infinitely variable traverse between 1¾" and 6" can be operated whilst the machine is in motion, can be seen. See figure 214A.

* * *

THE machine has been arranged so that the pitch or lay of wind can also be adjusted whilst winding from a minimum pitch or lay of .004", to a maximum of .477", and to deal with the various wires, three bobbin speeds have been catered for, up to 500 r.p.m., with quick setting arrangement for various diameters and traverse of bobbins. It will be observed that this Winding Machine has the many refinements which have been required in the trade for some considerable time, because it has always been known that to perfect braid, the winding must be correct, an operation which cannot be achieved by any hand winding, or an improvised machine, therefore, here is a self-contained motor driven unit that ensures correct winding for any type of wire braid, whether it be soft copper, or a wire of 150 tons tensile per square inch.

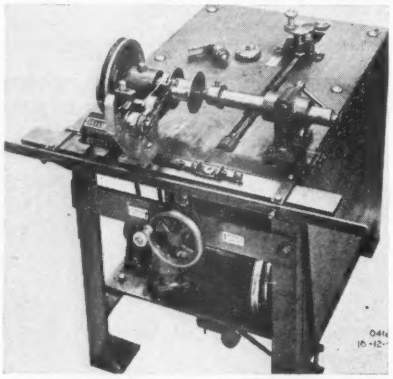

Fig. 214A. Universal Single Bobbin Wire Winding Machine. * * *

* * *

IT will be appreciated that to control the wire to the winding point, some form of tension will be required on the pay-out wires, therefore, in this direction our new design wire creel, for holding 12 pay-out bobbins or coils, up to a maximum size of 9½" diameter, is an essential part of the wire winding operation, it being necessary that an equal tension should be applied to each individual pay out bobbin or coil, and this must remain consistent.

ON Illustration No. 220 the creel is shown in position for winding and it will be observed that the wires pass from the bobbin through guide rollers and over the tension wheel again passing over guide rollers finally to the winding machine. If it is desired to wind from coils the Swifts shown underneath the creel can be substituted for the bobbins, therefore, on this creel in the first instance, we get individual tensioning on each wire before passing to the tensioning wheel which ensures that the final number of multiple wires are finally controlled by the common tensioning device.

* * *

THE next point to be considered is the wound bobbin, which is placed in position on the **"Triton"** High Capacity Wire Carriers, as illustration #164, where one bobbin is carried in the high position and the other in the low, this arrangement allows a greater capacity per bobbin than is possible with an ordinary wire carrier, in so much that a bobbin of 4½" diameter x 2" between flanges will carry approximately 6. lbs of copper wire, the tension on the wire being variable from 1½ lbs to approximately 4. lbs.

* * *

THESE Carriers have many special features, in addition to their large capacity, such as the Dual

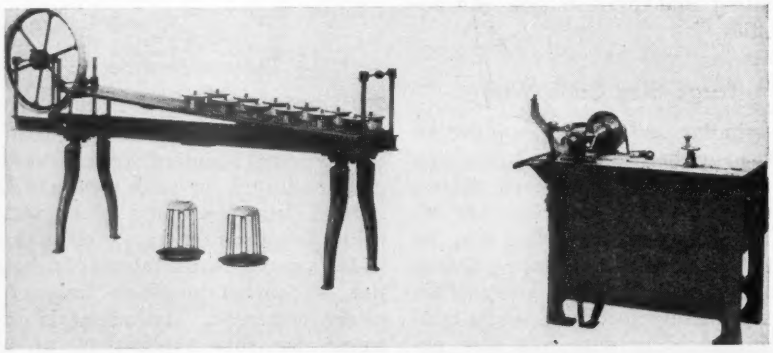

Fig. 220. — Universal Single Bobbin Wire Winding Machine and Creel. * * *

Balanced Adjustable Friction Brake Release Motion, which allows only the correct amount of wire to be paid out to the braiding point, ensuring each stitch is uniform. The bobbins have plain flanges, upon which the brake is applied to allow the correct feed of pay-out, the wire finally passing through special hardened rollers and swivel assembly, reducing the friction to a minimum.

* * *

THE **"Triton"** Carriers mentioned, are suitable for cables and hose where the braiding is carried out vertically, and passed over the haul-off capstan, generally in the case of these, where no great internal pressure is required, but a correct formation of stitches throughout is necessary.

* * *

THE Precision Wire Braiding is an entirely different matter, for in the first instance, the braiding is carried out on a mandrel passing through the machine in a horizontal plane, and, therefore, a special wire carrier is used, as illustration #236A. On this **"Max"** Carrier, several new features have been introduced, which, over a period of years, have proved successful in producing high pressure tubes, such as used on aircraft, gun-firing, or any hydraulic function where high pressures are used.

* * *

TO deal with the **"Max"** Carrier and its features in some detail, we feel will be of interest to our readers, and we would, therefore, suggest first to note the sturdy construction and the close proximity

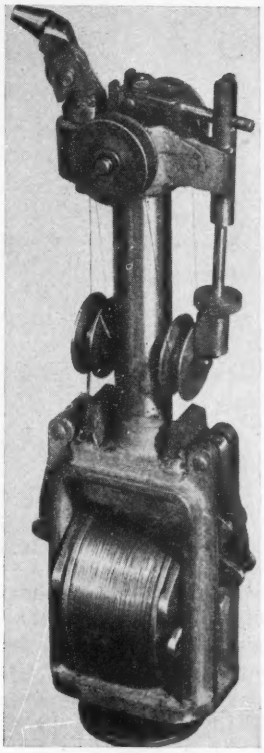

Fig. 236A. "Max" Wire Carrier.

of the bobbin to the base; keeping the weight of wire so low has considerable effect on the life, both of the carrier and race plate, at the same time allowing it to revolve with greater ease and less vibration.

* * *

THE actual **"Max"** Carrier is practically self-lubricating, and has perfect control of the wire through balanced heavy tension, by finger adjustment giving a constant tension throughout the braiding. The tension can be arranged from 12 lbs.

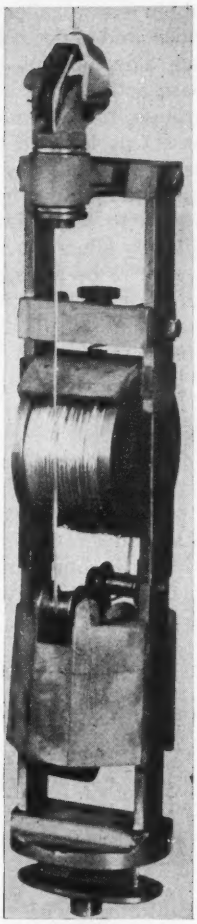

Fig. 164A. "Triton" High Capacity Wire Carrier.

to 30 lbs. The bobbin has no loose spindle to hold it in position, and is, therefore, easy to remove or replace, saving considerable time and avoiding loss of loose parts.

* * *

IT will have been observed that the wires pass from the pay-out

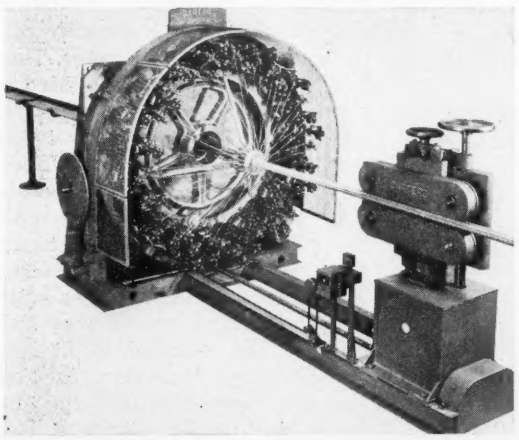

Fig. 267. — 48-Carrier Horizontal Wire Braiding Machine Arranged with "Max" Carriers.

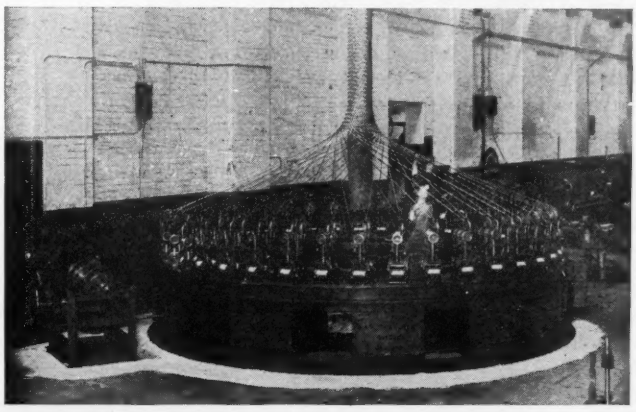

Fig. 208B. — 80 Carrier Vertical Wire Braiding Machine Arranged with "Max" Carriers.

bobbin over a roller at the back, and under and over rollers situated at each side, obtaining a double purchase action with a smooth passage through the swivel assembly to a correct position in the formation of the braid. Specially designed brake pads, operated by toggle motion and applied to the sides of the bobbin, will only allow the required amount of wire to be released and no more, therefore, perfect stitches are formed the full length of the high pressure tube or hose, and all the 'Vs' are in line.

* * *

IN the event of the wire running out, provision has been made to trap the end of the wire, so that it cannot spring away and become entangled in the machine. As the bobbins become empty, the electric knock-off motion automatically stops the machine.

* * *

THE braid has been formed, but must now be conveyed from the braiding machine with the same degree of accuracy, no slip or twist must take place, otherwise a poor product would be produced, and the capability of the **"Max"** Carrier lost. Here we have to introduce our continuous Twin Grip Chain Draw-off Motion, with rubber gripping pads, eliminating any possibility of slip or twist. The Conveyor is illustrated on #267, showing two hand wheels, one operating the self-centring mechanism, and the other for pulling the tubes forward to the braiding point, before starting the electric drive.

* * *

ILLUSTRATION #267 shows a 48 Carrier Machine with the conveyor, electric motor drive and the control for the variable speed gear, situated in a position to enable the operator to obtain the required lay or stitch without having to concern himself with changewheels.

* * *

WE had the largest braiding machine ever manufactured, built in our works during the war, for the purpose of making steel braided tube one foot diameter, composed of 1,360 steel wires, 105 tensile, .028" diameter. The make up consisted of first braiding 17 wires on a flat machine, and then winding this braid on to the 80 **"Max"** Carriers, each of them having a capacity of approximately 100 yards, with a tension of 54 lbs applied to each strand.

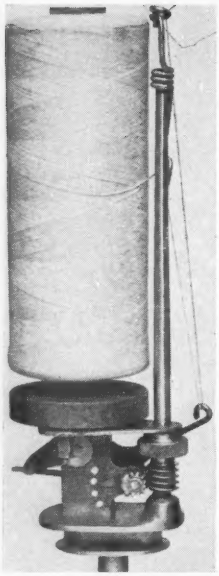

Fig. 290. Carter's Improved "ACE" Carrier.

* * *

THIS machine is 18 feet in diameter, and driven by two synchronized motors, worm reduction gears, and is evenly distributed to the horngears by a large centre gear running on roller bearings, therefore, no lag takes place between any of the 80 Carriers. The Haul-off is arranged by wire hawser and grooved drum, the latter being directly coupled to the braiding machine, as shown on illustration #208A, on the left hand side.

* * *

WE feel that it would be advisable to mention our latest Yarn Carriers, known as the **"ACE No. 1. "Speedway" Carrier,** for braiding with cotton, silk or any fibrous material such as used in the manufacture of Electric Cables, or any other article which has to be braided at a high rate of production, with a minimum of attention. To achieve this, the Carrier must be able to accommodate a large package, thereby allowing a high speed machine to run for long periods without having to replace the cheeses or bobbins. The **"ACE"** Carrier has these particular features.

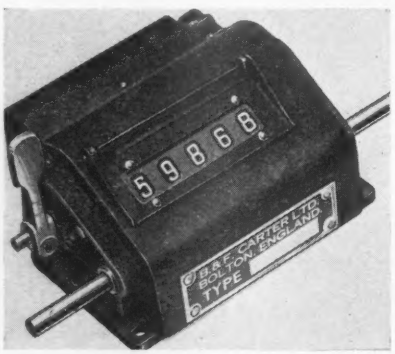

Fig. 277E. — Type 1. Pre-Determined Counter.

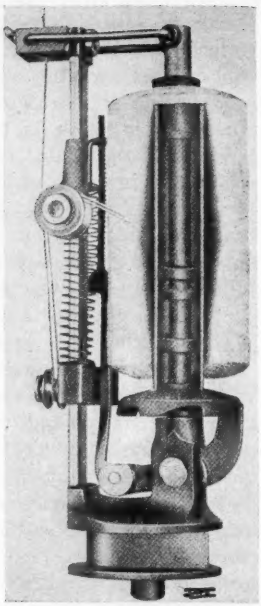

Fig. 263A. Carrier Showing Rol-Holder.

* * *

PERHAPS to follow the description of the **"ACE"** Carrier, it would be as well to refer to illustration #290. The first observation would be to note the large cheese or package, namely 5" traverse x 2⅛" diameter, suitable for running on a 4" diameter Horngear Machine, in place of the former **"Speedway"** Carrier which has a capacity of 5" traverse x 1.13/16" diameter. Therefore, the additional yarn carried will allow a longer run, although the **"ACE"** Carriers make 640 stitches per minute, against the **"Speedway's"** 480. Here we have the ideal size of package of yarn to reduce the cost of winding, and bearing these two figures in mind it will be readily seen the advantages of this development. Furthermore, these Carriers are supplied to fit existing Braiding Machines, the only alteration being that they run much faster and would require a faster drive.

(Please turn to page 926)

The Massena Works of Aluminum Company of America

A recent visitor to this great group of plants that lead up to the making of a large variety of sizes, kinds and shapes of aluminum wire, impressed by the gigantic operations that he was privileged to observe there, has set forth his impressions in the belief that they will interest wire men generally, regardless of the types that they may be producing or using at the present time.

WHEN an insatiably wire-hungry nation needs any of the multiplicity of goods or services that depend upon aluminum wire, it should pause and pay homage to those men of vision whose ideas have materialized in the extensive **Massena.** New York, works of **Aluminum Company of America** where this metal, once considered precious, is produced and fabricated on a scale that dwarfs the power of imagination.

* * *

MASSENA, a trim, clean modern village of 14,000 population, one of the northernmost in the State of New York, flourishes today by virtue of the great aluminum producing facilities that have been developed in its midst. Fifty years ago Massena was popular as a health resort due to its nearby mineral springs. This era passed as other larger and more accessible spas were discovered, but as the one "industry" waned, another of more permanent and far-reaching aspects replaced it—aluminum.

* * *

THE city is cut in half by the Grasse River, which flows north from the Adirondack Mountains, turns east and parallels the St. Lawrence River for several miles less than two miles inland from it, before contributing its waters to the might of the St. Lawrence. In this area a number of large islands divide the St. Lawrence into two main channels, the larger channel on the Canadian side being the Long Sault channel, so popular with tourists. The important point is that the rapids, caused by a sharp drop in the level of the river from the west to the east of Massena, provided the opportunity and incentive for the erection of hydroelectric power plant. The Gay Nineties therefore saw a power project born in Massena which later served as a source of power for producing aluminum. Water from the south Sault channel of the St. Lawrence is diverted through a short canal

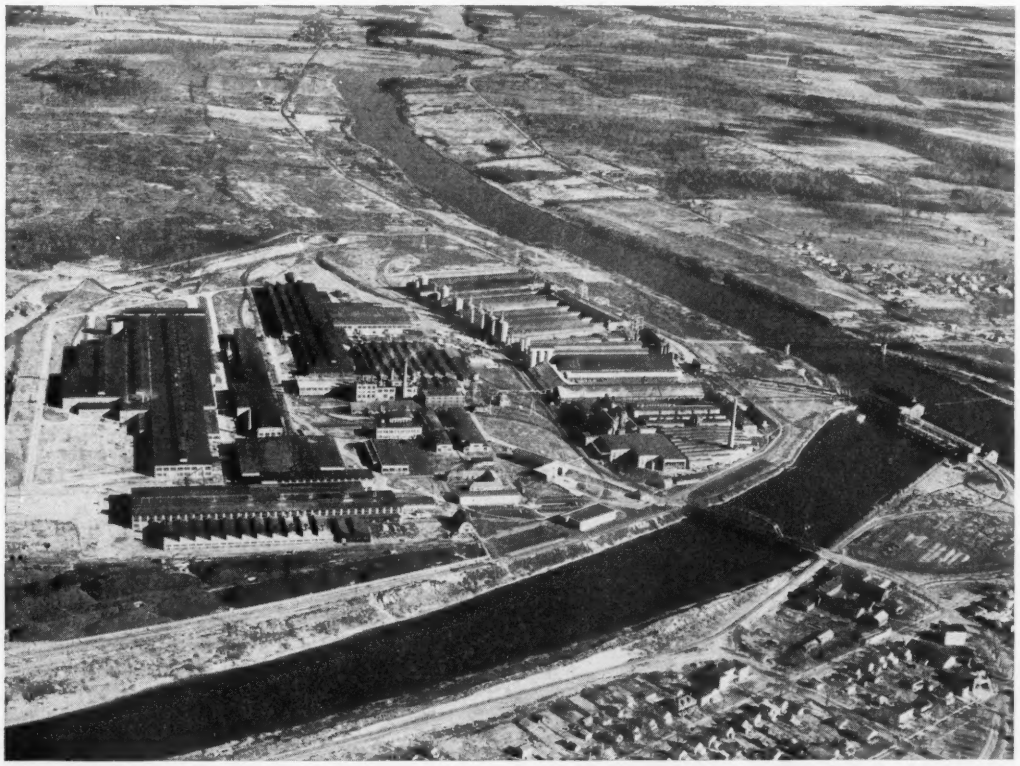

Fig. 1. — Aerial Wiew of the Massena Works

to the Grasse River. The head of water at the hydroelectric station is equivalent to the drop through the Long Sault rapids, and this water is used for the conversion of its dynamic energies into the direct current required in the reduction process.

* * *

THE first Aluminum Plant buildings were constructed in 1902 by **The Pittsburgh Reduction Company**, later to become **Aluminum Company of America**, to house the necessary equipment for converting alumina into aluminum. Electricity and more of it is the constantly pressing problem to which a solution must be provided whenever thought turns to greater production.

* * *

IN 1903, erection of the first wire mill was begun and it went into operation the following year. The first aluminum rods rolled at Massena were used to enlarge the conductor capacity of the power plant to the reduction plant. These massive bundles of rods are still functioning satisfactorily after more than forty years of continuous service.

* * *

THESE conductors lead directly into the **Reduction Plant** which day and night, twenty-four hours a day, is reducing alumina through the medium of the molten cryolite in which it is dissolved, into pure metallic aluminum. The silvery white liquid is tapped into a ladle from each electrolytic cell or "pot" as it is commonly called, and the metal is poured into pigs. There are several lines of pots, each comprising a number of individual cells. The process is continuous, and the alumina is added at regular intervals as required.

* * *

VARIOUS sizes of electrolytic cells are used in the **Reduction Plant**, and these cells require varying amounts of electric power. The voltage per cell is approximately the same, but the amperes required in the reduction process tend at present to vary from 25,000 to 50,000 amperes. The use of this terrific volume of current makes it readily understandable why every pound of aluminum produced requires a power consumption of approximately 10 kilowatt hours of electricity.

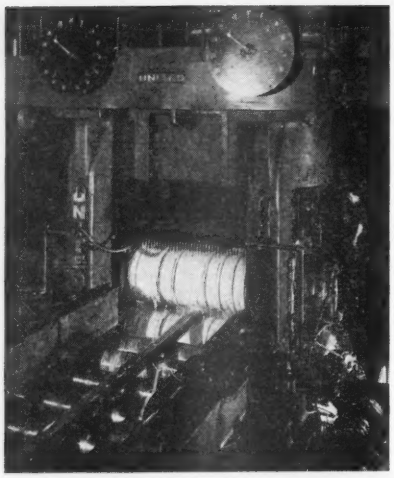

Fig. 2.—Closeup of entry side of 38 inch blooming mill showing an aluminum ingot entering the mill at one of its final passes. * * *

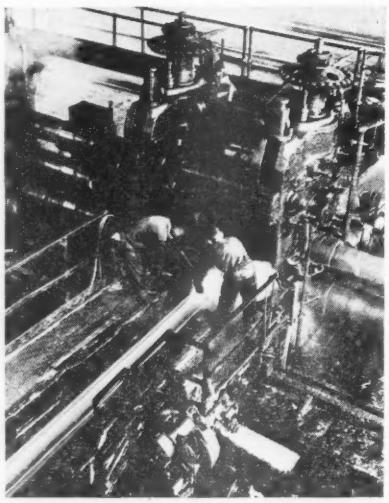

Fig. 3. — Rolling a strong aluminum alloy structural shape. Shapes such as produced here, are used in the construction of railroad passenger and freight cars, dragline booms, shovel dippers and overhead travelling cranes. * * *

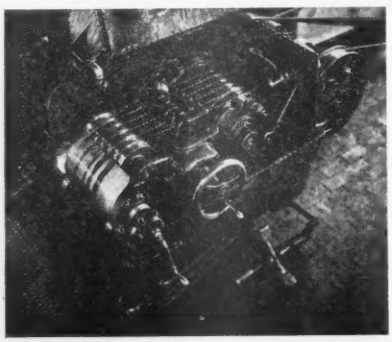

Fig. 4. — Six-Die sleeve type continuous wire drawing machine. * * * * * *

AN important operation, and an expensive one in the manufacture of aluminum, is the making of carbon anodic electrodes. The **Carbon Plant**, adjoining the **Reduction Works**, contains furnaces which are used in the baking of the electrodes. The electrodes which are formed into 125-pound blocks by hydraulic pressure, are placed in the furnaces and baked. An idea of the quantities required may be gathered from the fact that the electrodes are consumed in the process, and an electrode lasts from six to seven days in the electrolytic cell. Exacting care must be exercised to see that the electrodes are kept free of contaminating impurities.

* * *

THE composition of the aluminum has to be determined by analyses made in the **Chemical Laboratory.** After the metal is graded it is available for shipment to the **Fabricating Works.** Here the first step in the more familiar forms of aluminum takes place—remelting and casting into ingots for rolling. It is at this point that alloying takes place to provide some of the basic qualities required for the many differing end-uses to which the aluminum will be put. Ingots for electrical conductors, of course, are not alloyed, but in other types of aluminum wire the aluminum is alloyed, predominantly with copper, but also with magnesium, manganese, iron and silicon, singly or in combinations, to produce a wide variety of physical properties.

* * *

IN the **Blooming Mill**, the ingots are stacked until scheduled to be rolled into blooms. These are then further rolled in the 26″, 18″, 12″ and other mills to produce a wide range of semi-finished and finished products such as bars, rods, structural shapes which are duplicates of those produced in steel and special shapes which may be either rolled or drawn.

* * *

WIRE mill facilities were notably enlarged in 1926 and 1929 and further enlarged, practically to present capacity in 1939, so that the Company was well prepared at the opening of World War II to

meet the tremendous demands made upon it for rod, wire and bar. Among the outstanding late additions was the erection in 1943 of a Morgan continuous rod mill, which began operating at top speed in 1943. While some of the original rod-rolling equipment is still in use, the Continuous Mill has tremendously augmented the rod producing capacity at Massena. Numerous, but minor differences between this mill and those built for steel are noticeable. Most of these variations had to be built into the mill on the job after the erection of the major units. This mill with its improvisations, is the only one of its kind in the world. The final speed of the rod at the coilers is 2500 F.P.M.

* * *

WHEN rods are made as fast as they turn them out at Massena, it takes a big plant to convert them into forms that fabricators can utilize. Much aluminum alloy rod must, therefore, pass to the Merchant Mill, another division of the Fabricating Works. Here the ⅜″ rods are reduced by drawing to any desired size, the smallest being .0126″ Dia. for screen wire. The Merchant Mill has a well-equipped and stocked die room in which carbide nibs are finished and worn dies are recut and polished. Diamond dies are sent out for resizing. Included in the equipment are facilities for making special shapes.

* * *

MOST aluminum wire at Massena is drawn wet. A number of lubricants are used for different alloys and conditions. In the main, petroleum base oils are employed, but soap mixtures and grease are used on occasion for certain grades of wire. Stearates and other additives are made use of in instances where experimentation and experience have indicated that better results could be obtained with them.

* * *

MANIFOLD are the uses to which aluminum rods and wire are put. Some of the more common are chain-link fence, insect screen cloth, chicken wire, hog fence, clothesline, general utility wire, support wires, barbed wire, nails, screw machine products, rivets, fishing rods, golf club shafts, safety-pins, hair-pins, knitting needles, zippers, upholstery springs, electrical conductors, which includes house wire, telephone circuits, battery cables and power cables. There are other end-uses for this versatile material, and the list swells with each year turning up important new applications. Besides the garden varieties of round wires, innumerable shapes have been asked for and made—triangles, squares, flats, fluted sections and so forth. The fact that the oxide coating formed on the surface by the alumilite process can be dyed with a wide assortment of permanent colors, adds greatly to its attraction as a metal for many wire products.

Fig. 5. — Aluminum wire is drawn to extremely fine gage (0.010 or smaller) on machines such as this. * * * * *

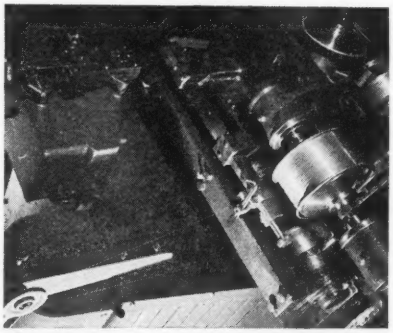

Fig. 6. — Drawn to proper diameter, the aluminum wire is rolled on spools, ready for use.

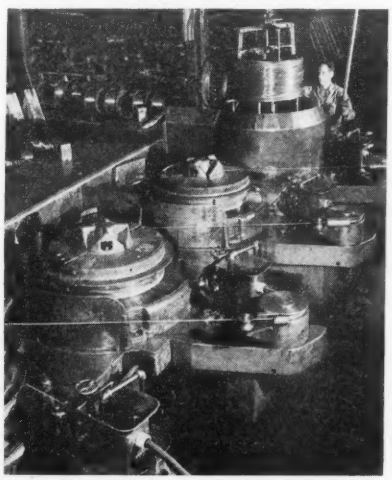

Fig. 7. — A wire drawing machine draws the aluminum wire through a series of successively smaller die openings. From the final draw, it emerges in the form seen at the rear ready for stranding. * * * * *

* * *

IN the foregoing paragraph, mention was made of power cables. A building called the Wire and Cable Mill is devoted solely to this activity. All wire stranded into cable is drawn on the Cable Mill's own wire drawing equipment from coiled rod rolled on the modern Rod Mill. The making of power cable at Massena has been a big and growing business over a long period of years, as for this purpose aluminum has economic, technological and practical advantage in its favor. The size, capacity and activity of this mill, another division of the Fabricating Works, is impressive. In 1946 it shipped a great many million pounds of cable.

* * *

AMONG the "oddities" in the Wire and Cable Mill is a specially designed patented water cooling system that has been added to a standard wire drawing machine ahead of the last die. In working aluminum, whether in rolling or drawing, much internal heat is built up. Wet lubricants and coolants, used profusely, assist in the dissipation of heat. In the particular water-cooling operation referred to, electrical conductor wire is drawn on the machine and it is necessary to cool the wire prior to the last pass so that the wire, after emerging from the finishing die, will have greater ductility.

* * *

AN industry that develops without prior or parallel precedent must learn many things the hard way. While engineers and tech-

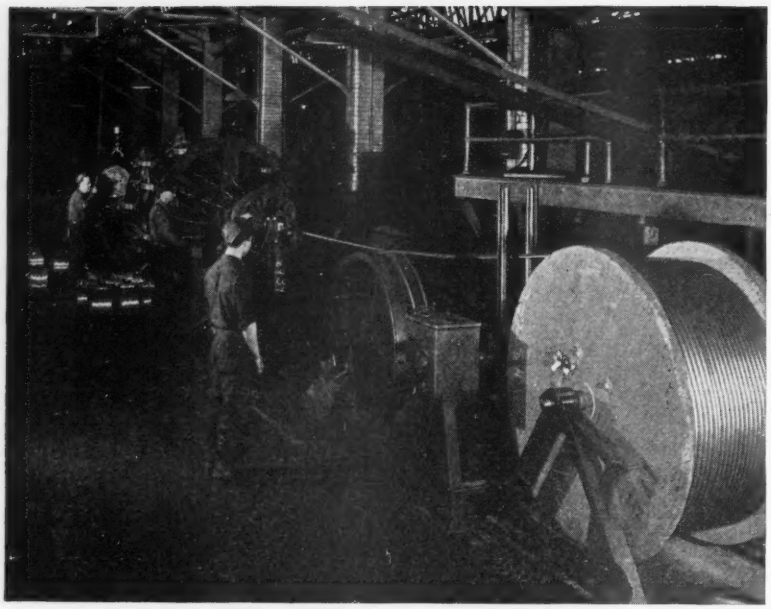

Fig. 8. — After the aluminum cable is stranded, it is wound on large drums for storage and shipment.

nicians have constantly labored to improve both equipment and methods, accidental discoveries have at times contributed to advancement. It is rumored how one hard copper-aluminum alloy, from which much was expected was "soaked" for the customary period and the subsequent rolling results all but caused its abandonment. Numerous trials were rewarded with nothing but negative results. The work was dropped and some ingots inadvertently left in the furnace for a couple of days. When the experiments were resumed, these blooms rolled flawlessly. It only required a few more tests to determine that a minimum of seventeen hours was needed to soak this particular alloy. Another story is told of a tough wire that was considered to require two passes. The work was scheduled for a double decker with a first light pass of 10% reduction and a second of 20%. That's the way it was to be done. When the boss was out of the way the operator, who worked on a bonus basis, remarked: "The hell with that," and set up the machine for a single 30% draft. It has been done that way ever since—a difference between theory and practice uncovered by the existence of a production incentive! From this it must not be inferred that aluminum is not as much in need of constant technical controls and analyses as any other metal. It is merely indicative of the fact that happy accidents can and do occasionally occur.

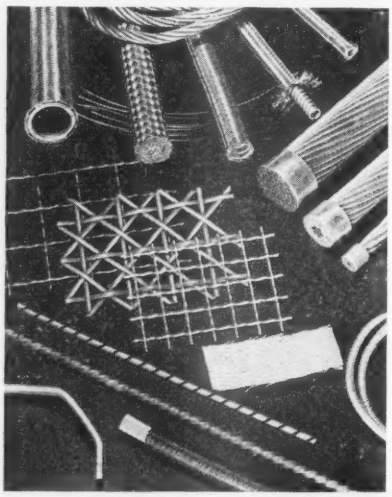

Fig. 9. — Typical products made of aluminum and rod. ★ ★ ★ ★ ★

* * *

THE **Aluminum Company's Massena** payroll embraces a total of about 4500 employees, of which about 3000 are engaged in the several mills which comprise the Fabricating Works. There are other industries in Massena, but it is readily evident that Alcoa and Massena are practically synonymous in that remote part of the country. Massena, however, is only one of many widely spread Alcoa operations. At other points bauxite is converted into alumina and similar reduction processes are repeated for aluminum to be used in other forms, such as sheet, foil, castings and the like. Massena, as the aluminum wire capital of the United States, is however, of particular interest to wire men.

* * *

ALUMINUM has come far, but its goal of achievement seems to lie ever beyond the horizon. As consumer resistance to change wears down, it is expected that wider acceptance of aluminum will broaden the base of present markets and lead into new ones. Aluminum is not an all-purpose metal, by any means, but it has won a large niche in the scheme of things that it has only begun to fill. Massena's sponsors are hopeful of further rising to their opportunities, to which aspiration, based upon past performance, they may well be expected to attain.

TO WIRE MILL MEN

Have you considered joining the Wire Association? You are cordially invited to become a member. Dues are $15.00 *a year, which includes a subscription to WIRE & WIRE PRODUCTS and a copy of the Annual Buyers Guide.*

THE WIRE ASSOCIATION

300 MAIN STREET STAMFORD, CONN.

An Investigation of Tempered Chrome - Silicon Spring Steel

American Steel and Wire Company
Worcester, Mass.
United States Steel Corporation
Subsidiary

Condensation of paper presented before American Society for Metals, Cleveland, Ohio, October 20-25.

THE demand during the war years for highly stressed springs, particularly for ordnance materiel, led to the development and use of several steels as substitutes for SAE 6150. One of the most successful of this category was a grade of steel known as chrome-silicon.

* * *

IN this investigation we have employed one heat of chrome-silicon steel which was processed to wire of 0.097 in. diameter, which was then continuously tempered to 48.5, 50 and 52.5 Rockwell C. The analysis of this heat of steel was: 0.57 per cent carbon, 0.76 per cent manganese, 0.014 per cent phosphorous, 0.017 per cent sulphur, 1.60 per cent silicon and 0.77 per cent chromium. Mechanical properties for each of the three hardness levels of tempered wire were studied and the results are presented in Table A.

* * *

IN the course of spring coiling, the elastic limit of the wire is noticeably reduced as a result of the cold working and such a lowering of the elastic limit results in a spring of inferior load carrying capacity. It is common practice in the spring industry to employ a low temperature stress-relieving heat treatment known as "bluing" to raise the elastic limit of the wire to its precoiled value.

* * *

IN the course of determining the mechanical properties of the blued steel spring wires it was observed that certain lots of tempered chrome-silicon spring wires exhibited a marked change in the general shape of the tension stress-strain curves. This change, when present, had been observed to take place at or above a bluing temperature of 500°F. and a number of variables have been studied to determine the cause of such behavior. A number of experiments led to the supposition that the hardness of the tempered wire was the deciding factor and accordingly one heat of steel was tempered to three hardness levels.

* * *

A study of the graphs shows that the bluing temperature seems to have no effect on the stress-strain relationship for the 52.5 Rockwell C wire; however, both 48.5 and 50 Rockwell C wires show a marked change in the general shape of the stress-strain curves as a function of the bluing temperature. The 48.5 Rockwell C wire shows a change at 600°F., 700°F. and 800°F. while the 50 Rockwell C wire shows a change at 700°F. and 800°F.

THE complete mechanical properties of the tempered wire at the three hardness levels have been plotted as a function of the bluing temperature. It is to be observed that the bluing temperature has little effect on the tensile strength of three lots; however, for both 48.5 and 50 Rockwell C wires the 0.2 per cent yield strength and elastic limit show a decided upward trend as a function of increasing bluing temperature while the 52.5 Rockwell C wire reaches a peak at about 600°F. Likewise, when compared to the 52.5 Rockwell C wire both 48.5 and 50 Rockwell C wires show equal or higher elastic limit values as blued at and above 500°F. No great change in per cent reduction of area is to be observed but the per cent elongation changes quite noticeably. From a study of these curves we are able tentatively to set 700°F. as the most satisfactory bluing temperature for

(*Please turn to page* 918)

TABLE A
Mechanical Properties of Tempered Chrome-Silicon Spring Wire

Hardness Rockwell C	Tensile Strength lbs./sq. in.	0.2% Yield Strength lbs./sq. in.	Elastic Limit lbs./sq. in.	% Red. of Area	% Elong. in 10"
48.5	247,000	196,000	169,000	47.2	7.3
50.0	260,000	190,000	168,000	50.0	8.1
52.5	281,000	246,000	213,000	49.4	9.3

TABLE B
Effect of Bluing Time on Per Cent Loss in Load
400°F. — 72 hours at 100.000 psi stress

Hardness	30 Minute Blue		2 Hour Blue	
Level	% Loss in Load	Hardness	% Loss in Load	Hardness
48.5	4.7	48.5	4.6	48.5
50.0	3.8	50.0	4.2	50.0
52.5	9.1	52.3	3.1	49.6

Compressed Air Helps to Make Better Cables*

IN the Passaic, N. J. plant of **The Okonite Company**, one of the country's foremost manufacturers of insulated wires and cables, compressed air is employed on a number of manufacturing processes, from wire drawing to cable shipment.

* * *

AS the first step in cable manufacture, copper rod is fed from coils into the wire drawing machine. Here it passes successively through several sets of liquid-cooled dies that reduce its diameter to the wire size being made. To lubricate the numerous bearings on this machine, compressed air at 45 pounds pressure is used to operate the pressure lubrication system.

* * *

WIRE that is to be coated with tin or lead passes through a bath of molten metal, kept at 800 degrees Fahrenheit by gas burners. These burners utilize low pressure compressed air, mixed with the gas in the correct proportion for proper combustion.

* * *

AIR also helps to prepare the compounds with which the wire is insulated. Compound melting pots use a low pressure compressed air and gas mixture in the burners. And air at 80 pounds pressure is employed on the Banbury mixer, shown in Fig. 1, both for operating the ram that forces the rubber compound into the mixing chamber and for opening and closing the outlet door through which the rubber mixture is emptied from the machine.

* * *

DURING World War II, **Okonite** manufactured special underwater cable that was protected with a unique sealing compound called "Duxseal". In the event of a break in the cable, this compound effectively sealed the broken ends against the entrance of water. Air at 80 pounds pressure was employed on the special apparatus that forced the compound into the interstices of the cable.

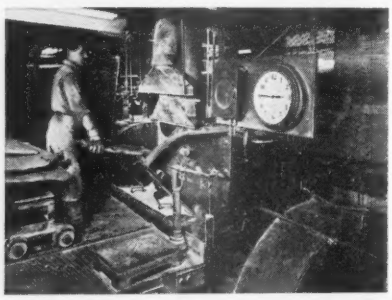

Fig. 1. — Ram and door of this mixer is operated by compressed air. * * * * * *

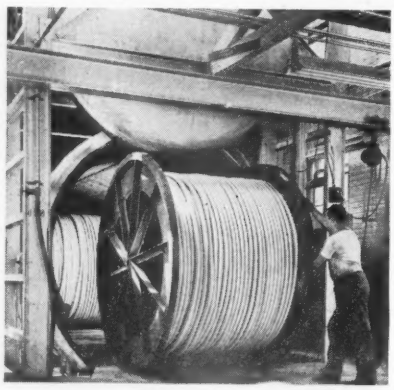

Fig. 2. — Compressed air forces gasket into place and seals door of this steam-heated vulcanizer.

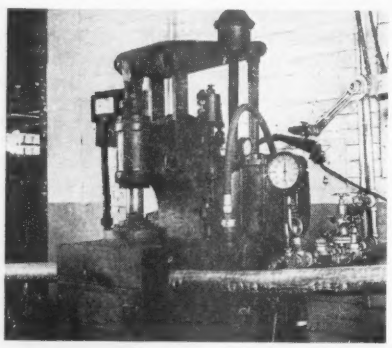

Fig. 3. — Air-operated vulcanizing press. * *

* * *

AFTER wires and cables have been coated with insulating compound they are placed in a steam heated vulcanizer, shown in Fig. 2. This is a ponderous cylinder, provided with a heavy iron door that seals the entrance. After the door is closed, compressed air forces a gasket into place to seal it.

* * *

AUTOMATIC control devices regulate the vulcanizing time, temperature, and the air blow-off that follows vulcanizing. A recorder traces on a chart the various steps in the process. The vulcanizers require the greatest quantity of compressed air of any equipment in the plant.

* * *

BEFORE being placed in the vulcanizer, cable is provided with a temporary lead sheath mold. After vulcanizing, this sheath is stripped from the cable and re-melted for further use. The lead melting pots used are heated with a mixture of gas and low pressure compressed air.

* * *

VULCANIZED cables are next passed through a high voltage testing apparatus. Here rollers are so positioned that every spot on the circumference of the cable is tested for possible defects. Defective places are then repaired on an air-operated vulcanizing press, Fig. 3, that is equipped with heated dies to vulcanize the repair compound.

* * *

A somewhat similar air-operated press is utilized for splicing strips of rubber together. This job was formerly done by hand. The

* **Data and photos for this article were obtained by the Compressed Air and Gas Institute through the courtesy of The Okonite Company, Passaic, New Jersey.**

air press not only does the job in a fraction of the time formerly required but makes a smoother splice.

* * *

THE machine for applying plastic insulation to wire is equipped with two interesting compressed air devices. As the wire leaves the insulation coating chamber it passes through a water bath that cools it. In order to remove the moisture that clings to the insulation before the wire enters the electrical testing apparatus, it is passed through a jet of compressed air, Fig. 4. This effectively removes any moisture present.

* * *

THE second application of compressed air on this machine is on the automatic mechanism that maintains a predetermined tension on the wire. As the wire passes over a series of rollers the degree of tension is transmitted to an air cylinder control through the movement of the rollers. The air cylinder in turn varies the adjustment of a variable speed drive, thus regulating the speed of the machine to maintain proper tension on the wire. This device is shown in Fig. 5.

* * *

CABLES to be sheathed with lead pass through a lead press, where hydraulic pressure applies

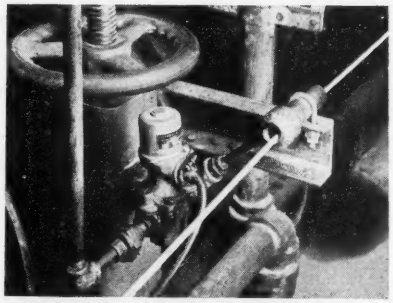

Fig. 4. — Wire passes through air jet to remove moisture from insulation prior to testing. * *

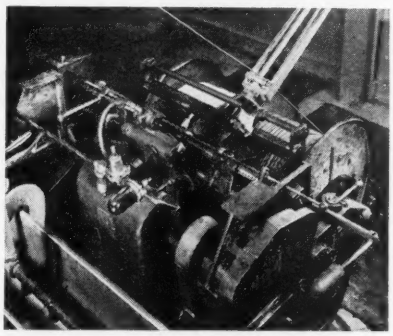

Fig. 5. — Air Cylinder varies adjustment of variable speed drive to maintain proper wire tension. * * * *

the molten lead to the cable. The lead melting burners on this machine are also operated on a mixture of gas and compressed air.

* * *

FINISHED cables are wound on reels for shipment. These reels are then stenciled with an air brush operating on compressed air.

* * *

NORMALLY, compressed air is not used in the boiler room, but connections are provided on the boiler fuel oil pumps so that in case of failure of the pumps the fuel oil can be fed to the burners with compressed air.

* * *

OF course, compressed air is also used throughout the plant for the usual cleaning of motors and machinery.

* * *

COMPRESSED air at 100 pounds pressure is supplied to the various buildings by three motor-driven compressors installed in a separate compressor room. The largest and newest of these, rated at 897 cubic feet per minute capacity, normally carries the load. The other two, rated at 480 and 250 cubic feet respectively, serve as standbys.

* * *

THIS company is enthusiastic about the use of compressed air power and is constantly on the alert for opportunities to make further applications where it will result in improved products, reduced manufacturing costs, or benefits to employee morale.

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Held at Chicago, Ill., October 20-23, 1947

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AUSTRALIA

By Oscar Semler
Consulting Wire Mill Engr. Melbourne, Australia

THE history of the Wire Industry in Australia is one of the most remarkable developments in industrial enterprise.

* * *

THE story of Australian Wire manufacture is closely tied to the original chief objective of the steel industry: national independence. And the steel industry in Australia is, practically, one name: **Broken Hill Proprietary Company.**

* * *

IN short: In 1912, an American consulting engineer, **David Baker**, of Philadelphia, arrived in Australia, and undertook the first survey of the prospects for the establishment of a large steel industry. Large deposits of high-grade ore in South Australia, and suitable coal in abundance in New South Wales, were the bases for Mr. Baker's first proposals. The blue-prints for the steel and rolling mill were agreed upon, and Mr. Baker became the first manager of the works. In April 1913, the first shipment of machinery arrived, and in June 1915, the Steelworks at Newcastle were officially opened.

* * *

THE Broken Hill Company was soon faced with the world-wide shortage of steel for rails, munitions of war, structural engineering purpuses, and merchant steel and wire rods, during World War I, and acted speedily. An 18 inch structural mill, then 12 inch and 8 inch, merchant mills were installed. Next, a **Morgan** continuous rod mill was established. This became the beginning of a start of an Australian Wire Industry. The **Morgan** mill began operations as a single strand early in 1918, and was converted to a double strand in 1921. Up till then, a number of small Australian wire drawing mills depended on imported wire rods from overseas. These were now in a position to obtain supplies of steel wire rods locally. This in turn had the effect of increasing production and efficiency.

* * *

PART of the **Newcastle Steelworks** and rolling mills had to close down for some months in 1922, because of overseas competition, but the sound basis on which the whole project was built enabled the Company to carry on after that, and to expand their own works, and a number of subsidiary plants.

* * *

THE largest steel wire producing plant in the Southern hemisphere, **Ryland Bros. Pty. Ltd.**, emerged from the subsequent process of amalgamation. This firm, originally British owned, commenced the drawing of wire from imported rods in 1911, in the State of Victoria. Wire and nail manufacture was started on a large scale in 1919, in a factory near the Steelworks at Newcastle. In 1925, **Broken Hill Proprietary Co.**, took over the entire interest of the former owners of **Ryland Bros.** in Australia. This plant, also **Lysaght**, another unit of the B.H.P. combine, is supplied exclusively with steel rods by the parent company, for the production of nail wire, barbed wire, fencing wire, and wire netting, and also various special high grade steel wires.

* * *

PRIOR to World War II, a census in 1937 set the capacity of the Australian Wire Mills, utilized to approx. 75%, at an annual production of 158,000 tons of rolled wire, 27,000 tons of wire nails, 35,000 tons of barbed wire, 41,000 tons of fencing wire, 7,000 tons of wire netting and gauze, and 5,000 tons of various wire products. At that time, it was considered that the Australian market was nearly covered by local production. At the same time, quantities of products were exported to New Zealand, the Dutch East Indies, etc.

* * *

IT is interesting to compare these figures with similar statistics in the United Kingdom, of the same period:

Wire Rods ..... 613,200 tons
Split nail rods, bars, sections, ... 199,600 tons
Germany, at the same time, produced: 1,248,000 tons /metric/ of wire rods.

* * *

AND what did the industry achieve during the war /1939-1945/. **Rylands**, who now produce the bulk of Australian wire, manufactured 335,000 tons of wire and wire products, including thousands of tons of wire for telephone cables, submarine and torpedo defence nets, paravane cables, etc. Also considerable quantities of "Barblock" wire for the armed forces were produced in Australia. This was made from spring steel, and some 127 million yards of this special barbed wire, were produced in Australian plants during the war.

* * *

Steel Wire Rope Industry, Newcastle, New South Wales.

THIS is associated with the parent **Broken Hill Company**, and **Ryland Bros.** The works supplied 38,000 tons of cables, ropes and

strands, representing some 205 million feet, ranging from 0.43 inch diameters up to 10½ inch sizes.

* * *

THE production figure for the year ended June 1947, was 4944 tons of varied ropary products.

* * *

Cold-rolled Steel Strips

THIS manufacture was only started in 1941. The tonnage produced during the war approximated 32,000 tons.

* * *

Wire Products

THE refining industry, including the manufacture of nails, rivets, metal screws, wood screws, wire gauze, fly wire and many other products, is supplied almost exclusively from the **New South Wales** mills. The production covers the Australian market. Importation of wire products, excepting a few specialties, is negligible.

* * *

Non-Ferrous Wire

THE development of an Australian steel wire industry was practically a function of the growth of the big **Broken Hill Proprietary** works. In the case of the non-ferrous wire industry, the same applies to **Metal Manufacture Propietary Limited,** Port Kembla, New South Wales.

* * *

THE first World War brought a shortage of copper and other non-ferrous wire and products. The above company was, at that time, primarily engaged in producing wire for the rapidly extending telephone network.

* * *

COPPER mining was begun in various regions of Australia early in this century. Eventually, Port Kembla, near the chief source of supply, was chosen as the centre of a non-ferrous metal industry.

* * *

BRITISH Insulated Cables Ltd. provided technical guidance, and in 1918 the first rolling mill was established at Port Kembla. Subsequently, drawing machines were installed, a treble strander began operations, and a 7-wire high speed strander followed. The production of telephone cables commenced in 1923, with an order for 5,000 tons of post office line. Gradually, the plant was modernized, and efficiency raised greatly.

* * *

Production Figures

FROM the start of operations till 1939.

Copper and Cadmium-Copper Wire	**19,644 tons.**
Commercial Wire	**7,300 tons.**
Trolley Wire	**2,800 tons.**
Brass Wire	**714 tons.**
Stranded Conductors: Copper, Cadmium-Copper, Steel-cored Aluminum Wire	**85,000 tons.**
Telephone cables, also armored, braided wire and cable, cotton and paper covered wire	**31,627 tons.**

* * *

THE wartime expansion of the industry is quite impressive. Definite figures are not at hand yet, and it may be the subject of another survey to describe war-time and post-war developments in the Australian Non-ferrous Wire Industry.

Cable Industry

THIS is in a state of development only. The demand will exceed production for some time to come.

* * *

Outlook:

THE Australian Steel Wire Industry, based on raw materials production at prices rather lower than world market levels, is in a favorable position to supply the fairly large home market The latter absorbs the bulk of production.

* * *

IT has been shown that the productivity of the wire industry is a function of local steel making capacity. Some 90% of the industry is based on the efficient key plants in New South Wales.

* * *

IN addition to covering the home market, there are good prospects that Australian Wire and wire products will be exported to the Far East, the Middle East, and to other areas situated in a geographical position favourable for an Australia-based production.

* * *

WHILE the capacity and outlook of the Non-ferrous Wire and refining industry is somewhat different, owing to its being based on its own raw materials to a lesser extent, it can be expected to cover, in the future, the local market, and also supply some requirements of New Zealand and the Eastern countries.

* * *

YOU ARE INVITED TO JOIN THE WIRE ASSOCIATION

To those wire mill men who have not already joined the Wire Association for the mutual benefit of those engaged in the operating end of the Wire Industry, a cordial invitation is extended to become a member.

If you are making rods and wire—of steel, copper, brass, alloy or any ferrous or non-ferrous metal, or are in the wire products end—nails, bolts, screws, rivets, wire rope, wire cloth, springs, electric wire and cable or any of the numerous products made of wire, you will benefit by identifying yourself with the Association.

The Wire Association is a non-profit organization of wire and wire products mill superintendents, executives and foremen, whose specific purpose is to improve production methods and afford a clearing house for ideas on management, technical and research problems, and to develop and maintain friendly relations among members.

Dues, including a subscription to WIRE AND WIRE PRODUCTS, a copy of the BUYERS GUIDE and the various services to members, $15.00 per year. Pl ease write today for a membership application card.

THE WIRE ASSOCIATION

300 MAIN STREET — RICHARD E. BROWN, Executive Secretary — STAMFORD, CONN.

By Oscar Semler,
Consulting Wire Mill Engr.
Melbourne, Australia.

Czechoslovakia's Wire Industry

AFTER the first World War in 1918, the Austrian-Hungarian Empire collapsed, and Czechoslovakia achieved independence. This made it necessary for industry to reorganize manufacturing conditions, and to find new markets under quite different conditions. The democratic Government of the Republic, in cooperation with the management and the workers of the Industry, succeeded in overcoming all difficulties. Within some three years of hard work, industrial production had practically reached the normal pre-war level. Further steps in rationalization of the plants were undertaken. Production methods were brought to the most modern standards and incentive payment to employees, were means of successfully increasing production in this most industrial country of Central Europe.

* * *

Steel Industry

THE three large Steel Works in Trinice, Vitkovice, and Kladno, produced some 70% of the total manufacturing capacity of the old Empire. As far as capacity was concerned, the same could be said of the Wire Industry. Three Steel Works and Wire Rod Rolling Mills remained in the new state to supply the well-developed Wire Mills and Wire Refining Plants: **Trinice** in the East of Silesia, close to the Polish border, and **Kladno** and **Most** in Bohemia. Trinice supplied their own Wire Refining works at Bohumin. So did Most, which supplied raw materials to all associated Wire Refining plants. The production centres of the Wire Industry were spread all over the State, but most of the manufacture was being carried out in the East of Silesia, on one hand, and Western Bohemia on the other.

* * *

Production Figures /1937/

Wire Rods	**169,000 tons.**
Compare with Germany's	**1,248,000 tons.**
Czechoslovakia's export of Wire Rods	**37,000 tons.**

* * *

THIS placed Czechoslovakia in the 5th place of Wire Rod exporting countries in the World.

① Blast Furnaces. [2] Steel Works & Rod Rolling Mills. ③ Wire Drawing Steel/Wire Products. ④ Non-Ferrous Wire. ⑤ Cable Manufacture * * *

(*Please turn to page* 916)

War-time Progress in the German Wire Mills

LIKE the American, the German wire industry tends more and more toward reliance on scientifically established principles. Research establishments, public, private, and governmental, are constantly at work not only on the fundamentals but also on specific problems. Fundamental research is sponsored by the various branches of the **Kaiser-Wilhelm Foundation** for the Advancement of Knowledge; the spot researches are the affair chiefly of private research organizations. Between these two stand the technical societies; in the field of wire the work falls upon the **Kaiser-Wilhelm Institut fur Eisenforschung und Metallforschung,** the **Verein deutscher Eisenhuttenleute,** and the **Deutsche Gesellschaft fur Metallkunde.** Most of the matter that follows is from reports of these organizations.

* * *

Rod Rolling

COMPARED with the American mill, the German rod mill has more numerous and much smaller orders; for example, the stock list of one of the large plants contains over a hundred different qualities of wire, all of which reflect on the work of the rod mill. The pure continuous type of rod mill has but a small field in Germany. Fig. 1 shows one of the latest of German rod mills. A single continuous rougher is followed by four finishing trains, each consisting of six stands, single strand. The output is 35 tons an hour. Of a total of 38 stands, 24 are in the finishing trains. A billet of 55 mm goes down to rods of 5 to 8 mm in 18 passes. The loops in the roughing mill are held under such close control by speed adjustment that there is no appreciable cooling, which contributes greatly to uniformity. Other factors affecting uniformity are roller bearings, automatic repeaters, and roll bodies too short for appreciable springing.

* * *

Wiredrawing

EXTENSIVE researches have been directed toward the heating of wire during cold work, and the effect of that heating on the lubrication and upon the properties of the product. The heating is an effect of the displacement of metal as well as of die friction. According to **Eichinger** and **Lueg,** not over 10% of the work necessary to deform the wire is stored in the product as latent energy. The distribution of temperature during the passage of the wire through the die is shown in Fig. 2, for stated conditions. Deformation of drawing gives rise to temperature increase (t_1) of about 70° C (158° F) in the outer layer of the metal, at a speed of v = 1 m/sec., and the friction to an increase (t_2) of about 120°, (248° F) a total of 190° (374° F. An increase of speed to v = 2 m/sec. causes an increase to 70 + 165 = 235° C. (454° F) and at the same time the thickness of the layer influenced by the frictional heat drops to 0.45 mm.

* * *

THE non-uniform heating of the cross-section of the wire causes characteristic high **tensile stresses** in the outer layer, and a consequent characteristic **compressed stress** in the inner and cooler grains. The mean temperature rise in Fig. 2 amounts to 2.6x50x.44(1+0.4+0.15) = 89° C. (192° F). At a speed of 1 m/sec. the tensile stress in the outer layer reaches a value of 0.35 (189-89 = 35 kg/mm² (12,460# 1 sq. in.). The distribution of temperature throughout the section is shown in the lower part of Fig. 2.

* * *

THE **Kaiser-Wilhelm Institute** conducted a research with a .58% carbon steel wire and a dead soft rod into the influence of prestressing on the stress in the die, the total pull on the block, and their relationships. Strictly in conformity with the theories any significant relief to the die was accompanied with a considerable increase in total pull, and at the same time a slightly greater decrease in

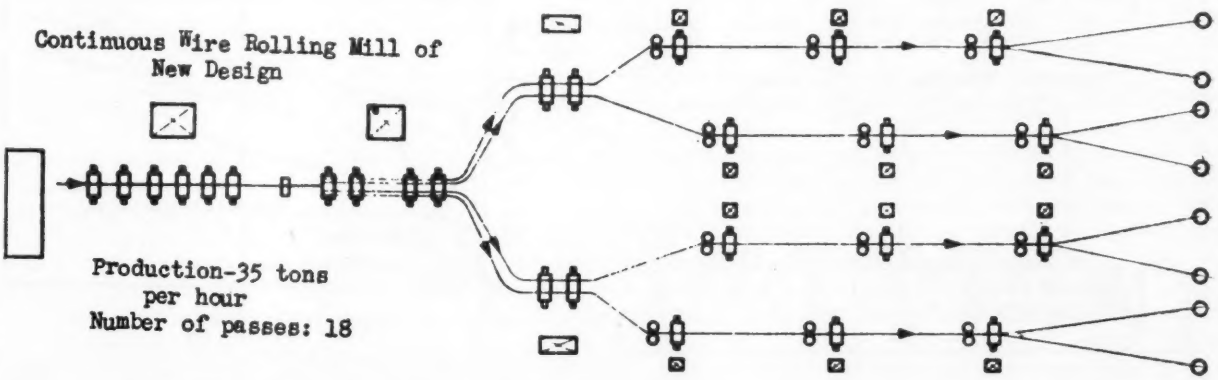


Fig. 1. — One of the Latest German Rod Mills. * * *

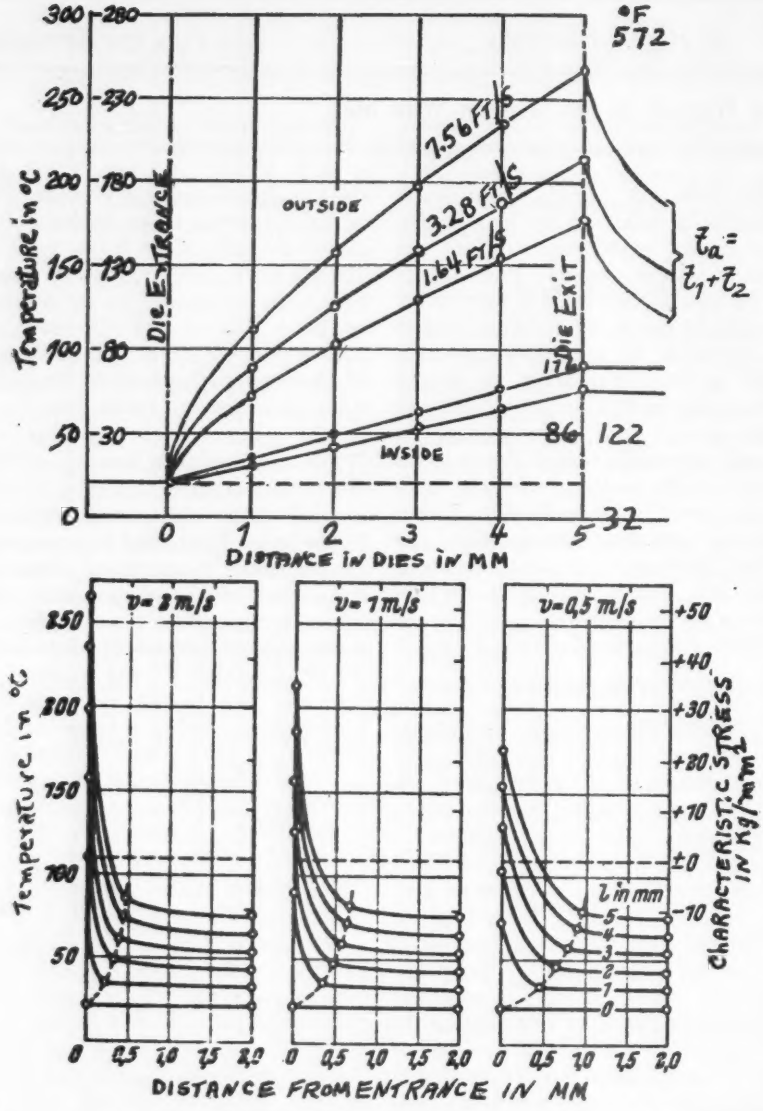


Fig. 2. — Distribution of Temperature During the Passage of the Wire through the Die. * *

the actual work performed by the die. The tensile and the relative temperature at the exit of the die hole both sank as the back-stress was increased. The savings in die and power cost are trifling, of course, but with the decrease in die pressure is associated a promise of longer life for the drawing equipment itself, as well as the possibility of using it at higher speeds.

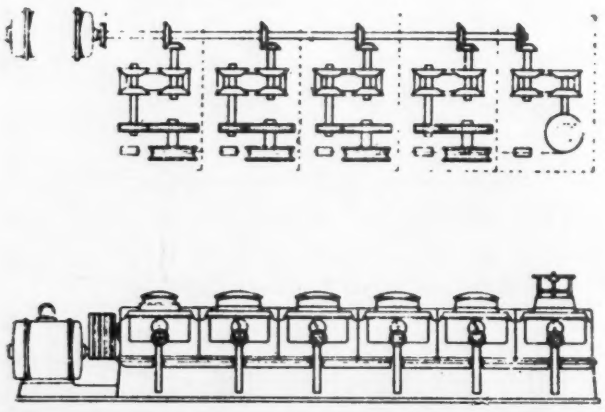
* * *

AN interesting development has been a new continuous machine built up from single block units, which has advantages over both the **Vaughn** and **Aetna-Standard**. It features a chain-drive arrangement capable of affording stepless adjustment which is exact in a range 1:3.4 to 1:6. This drive has had several years service in straight benches for bars and tubes. Even with more than seven drafts a simple star-wheel adjustment keeps individual block speeds within one revolution. The machine is built with either horizontal or vertical blocks, as shown in Figs. 3 and 4. The novelty of this machine is the almost exact speed adjustment achieved with a single driving motor.

* * *

Wire of Zinc Alloys

IN the first world war exhaustive researches were conducted as to the suitability of zinc and its alloys for electrical conductors, but with unsatisfactory results. These researches were taken up again under different auspices in the laboratories of the Siemens interests and the



Figs. 3 & 4. — Continuous Wire Drawing Machine Built up From Single Block Units. * * * * * *

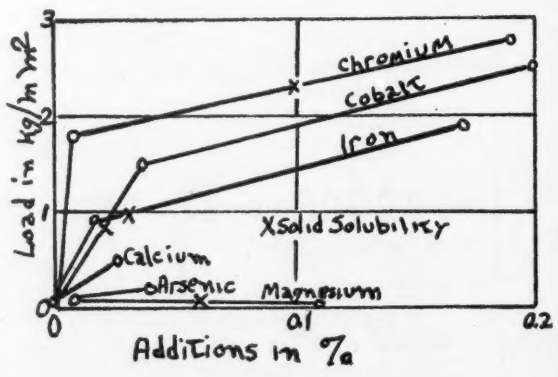


Fig. 5. — Shows the Influence of the various additions on the Stability of the Alloy. * * * * *

Metall-Gesellschaft. The metals tried in the earlier experiments were unstable. This time the base metal was zinc of 99.9% purity and the additions were of such character that wire drawn from the alloy would retain its fine grain on heating to at least 200° C. As cast, the most notable grain refinement was with the A1 and Mg additions, but A1 is not desirable in a wire alloy and Mg lowers the ductility. The best all around wire alloy was one with 0.8 A1, 0.4 Cu, the rest zinc. The product was a good workable wire with a good creep test and adequate static properties, suitable for welding and soldering, and retaning its fine grain at 200° C. Further inquiry into the effect of other additions indicated that the resistance of zinc to creep is considerably increased by chromium, cobalt, and iron, especially in their range of solid solubility in zinc. The zinc-iron alloy with 0.15 iron seemed particularly suited to electrical installations. Fig. 5 shows the influence of the various additions on the stability of the alloy.

* * *

Patenting in Sodium Nitrate

EXPERIMENTS in the use of salt baths as patenting media were already under way before the war; after the war started they were carried into the field of fundamental research. The conclusion reached was that salt baths are an excellent patenting bath. This pronouncement has already been abundantly checked in practice, about ten thousand tons having been processed with no ill effects whatever. Both research and practical experience agree that with suitable equipment and practice the salt bath is at least equal to the lead bath, and during the war many installations were converted, with various heating arrangements.

NOT only rope wire but also spring wire of the highest tensile and toughness were salt-patented. As the specifications go, spring wire must stand up to the usual twist test with a higher tensile; unless it is patented at a particularly high temperature there will not be the complete solution of perlite and the desired grain size in sorbite.

* * *

AS for the further prospects of the German wire industry, they depend chiefly on the political developments in Germany and in Europe. The British-occupied zone harbors most of the rod mills and wire plants; in March of this year the zone produced 16,800 tons, about the normal monthly output of a single fair-sized American plant. Bettering of this record depends in no small measure on success in solving the problems of undernourishment.

GERMANY

By Paul Fidrumuc

Germany.

THE production of steel wires in Germany is still very reduced. The total output 1946 has been as follows:

British Zone	**167.735 tons (metric)**
French Zone	**21.486 tons**
Russian Zone	**18.771 tons**
American Zone	**11.208 tons**

* * *

THIS does not include the Saar, where the production was approximately 14.000 tons. The total output compares therefore very unsatisfactorily with pre-war years, when the output (without Austria and Czecoslowachia) was between 1.1 and 1.2 Million tons. According to a report of the Eisendrahtvereinigung e.V Düsseldorf (German wire cartel), there is not much outlook for an increase of the production this and next year. Shortage of wire rods is very severe, also of coal and electric current. It is estimated that the output will be this year approx. 5% lower than last year, mainly due to severe production restrictions first quarter of this year.

* * *

THE output of wire nails is so small, that supplies are difficult to obtain even by barter against food. Stocks of any wire product material are not existent in Germany.

* * *

THE capacity of the German wire and wire products industry compared with 1939 is as follows: British Zone 67%, French Zone 72%, Russian Zone 40% and American Zone 77%. The low figure for Russian Zone is due to heavy dismantling operations effected last year. The general lower capacity is explained by war effects (bombing etc.).

* * *

IF the actual production is taken into consideration, it is obvious, that the reduced capacity is only used to a very small extent, some works being shut down, others working with only 30-45% of the actual capacity. The number of workmen on the pay-roll however is almost 75% of that in 1939. Wages are 8-10% higher. The overhead charges and general production costs are much higher therefore than 1939, prices however only 6-10% up. Still the industry does not work with losses. This phenomenon is explained by the circumstance, that the industry sells between 15-25% of her output "by compensation". And in doing this such profits are made, that the loss on the regular business is more than "compensated". The much higher number of men per ton produced is explained: a.) under-nourishment and therefore low production; b.) extraordinarily high repair work on obsolete and broken down equipment; c.) replacement of machinery by handwork; d.) 1-2 days per week lost per head by efforts to provide food additional to the 1000-1200 calories a day the man is getting at present.

* * *

EXPORT business in wire or wire products does not exist at present. Some inquiries have been received, but no business has resulted. The German wire industry is not thinking at present to revive export trading.

* * *

CZECOSLOWACHIA'S wire and wire products output was 103.100 tons last year, this is 9%

(Please turn to page 917)

LABOR RELATIONS

by John B. Stone,
Washington, D. C.

The seventh of a series of articles on the subject, with particular reference to problems of the wire and wire products industry. The author is a noted authority on the subject.

WITH both major labor federations making up their minds about the **Taft-Hartley** law and with scores of "test cases" on various provisions of the law reaching the courts in many parts of the country, a new phase in the history of the much debated legislation has arrived.

* * *

EMPLOYERS of labor, particularly the middle and small sized manufacturers, should have a more clear idea of where they stand in relation to their workers under the new law within a few weeks now.

* * *

FOR one thing the United Electrical, Radio and Machine workers of the Congress of Industrial Organizations (third largest CIO union, have made it emphatically clear that they will have "no part" of the **Taft-Hartley** law. Not only will they act as if the law had never been passed but at their recent national convention in Boston they called upon the employers with whom they negotiate to join with them in boycotting the law and the National Labor Relations Board so long as the law remains on the federal statute books.

* * *

THE huge brotherhood of Machinists which broke several years ago away from the American Federation of Labor in a jurisdictional row with the Carpenters, has made it plain that though they are opposed to the **Taft-Hartley** law and will do everything in their power to have it repealed, so long as it is the law, they will abide by its terms.

* * *

THE powerful Metal Trades Department of the American Federation of Labor, headed by John P. Frey has taken a similar stand. They will respect provisions of the act so long as it remains the law of the land, working meanwhile for its repeal.

* * *

ON the other hand John L. Lewis has led his giant United Mine Workers of America into the camp of uncompromising opposition and boycott of the new law. On his side of the fence in this issue is the International Typographical Union, which decided at its last convention to negotiate no new contracts so long as the closed shop is banned by law. Already the ITU is facing at least two suits charging it with unfair practices for refusing to negotiate.

* * *

AN important aspect of the decisions of the United Mine Workers and the Typographical Union is that neither union is regarded as "left wing". In fact both are headed by outspoken enemies of Communism and of Communist influence in the American labor movement.

* * *

WHAT this means to the individual Manufacturer of Wire and Wire Products is this—that it is still too early to assume that it is safe from a standpoint of peaceful labor relations to demand that the new law should be rigorously enforced. It would appear that a careful plan should be worked out with full understanding of how the individual union being dealt with feels about the law. Otherwise, it is still possible to touch off serious labor trouble by demanding that a union which is boycotting the law, should follow it to the letter. Before such action is taken the employer should reckon whether he is ready to fight it out with the union on that score.

* * *

WHILE the stand of individual unions on the **Taft-Hartley** law is being worked out at national conventions, developments behind the scenes of the national labor movement have taken a turn which is attracting no little attention from close observers. By placing himself in the absolute forefront of the uncompromising fight against the **Taft-Hartley** law, John L. Lewis, many observers believe, is making a shrewd bid for leadership of a united American labor movement.

* * *

In flatly refusing to sign the required affidavits that he and his fellow officers are not Communists and have no sympathy with Communists, Lewis put himself at the head of the all-out opposition to the law.

* * *

In doing so he has had to sacrifice his pet "catch all" union, District Fifty of the United Mine Workers, which took in workers in any line and gave him an opening wedge for challenging the leadership of other AFL unions and CIO rivals in many fields. Hundreds of District Fifty collective bargaining elections will be lost by default because its officers have not signed the affidavits.

* * *

SOME observers have predicted that this means Lewis is ready to write off District Fifty as a bad investment. But men close to the miners' chief take an opposite view.

* * *

THEY state that Lewis by being the first national leader to re-

(*Continued on page* 920)

GOVERNMENT WIRE PRODUCTION INFORMATION

Tungsten Wire and Lamp Factory

MANUFACTURING processes and equipment employment by a German tungsten wire and lamp factory with a production capacity of ten million lamps per year are described in a report now on sale by the Office of Technical Services, Department of Commerce.

* * *

THE report, made by **H. R. Williams** of the Australian Scientific and Technical Mission for the British Intelligence Objectives Sub-Committee, is based on visits to the Radium Elektrizitats G.m.b.H. at Wipperfurth in the Rhineland.

* * *

A related report on German tungsten and molybdenum wire manufacture, made by **D. E. Tesen** for the Field Information Agency Technical, is also available from OTS.

* * *

ALL damage to the Radium Elektrizitats factory had been repaired and production resumed. The factory is fully equipped for the production of tungsten lamp filaments from the processing of crude tungsten hydrate and scheelite to the production of tungsten wire from tungsten powder.

* * *

IN making the wire the tungsten powder is pressed, pre-sintered, and sintered. The sintered bar is then hot swaged to rod and wire, and the wire hot drawn. Two types of wire were being produced, one suitable for vacuum lamps and single-coil gas-filled lamps, and the other suitable for coiled coil gas-filled lamps.

* * *

THE report is illustrated with photographs showing reduction furnaces for tungstic oxide, pre-sintering furnaces, presses for tungsten powder, sintering bottles for tungsten rod, swaging machines, and set-ups for bench drawing of tungsten wire.

* * *

A section of the report also describes the methods used by Herman C. Starck, A. G. for producing pure tungstic oxide from scheelite ore containing molybdenum.

* * *

AN appendix to the report contains photos and details of elutriation apparatus used to test the size of the various processed tungsten powders.

* * *

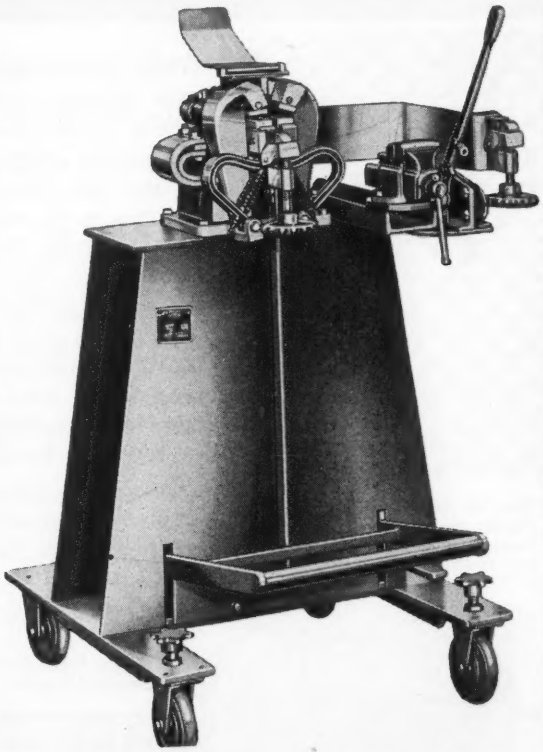
ORDERS for the reports PB-3604 (**Production of tungsten wire and processing of Scheelite;** 51 pages, microfilm, $2: photostat, $4) and PB-18785 (**Tungsten and molybdenum wire;** 17 pages, microfilm, $0.50; photostat, $2) should be addressed to the Office of Technical Services, Deparment of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

MICROMETER PRECISION

MICRO-WELD

TRADE MARK REG. U. S. PAT. OFF.

MODEL "J" TYPE AUTOMATIC MICRO-WELD BUTT WELDER



This type welder is available in five Models (J-45-C) (J-5-C) (J-6-C) (J-7-C) (J-8-C) for welding COPPER, ALUMINUM, and other non-ferrous wire and rods, ranging in size from .080" to 1/2" diameter.

The welding cycle on these units is automatically completed by one single downward stroke of the foot pedal, which clamp the stock being welded, contact the welding switch, and apply the upset pressure on the weld.

All welders are equipped with annealing dies, filing vise, hand shears, and mounted on a 4-wheel truck.

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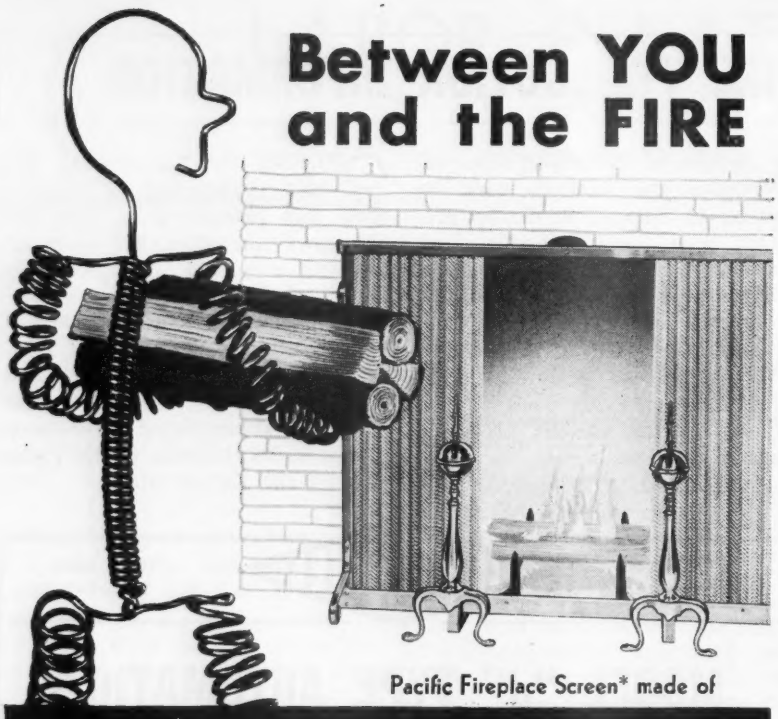
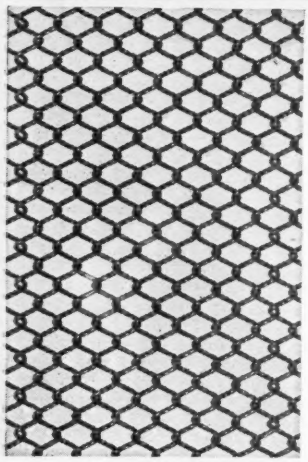


Pacific Fireplace Screen* made of

KEYSTONE WIRE



Note the fine, expert weaving of Pacific fireplace screen, requiring steel wire of highly uniform thickness and temper.

Whenever you find outstanding value in a product, you usually find plus quality in the materials used.

This is true of Pacific* fireplace fixtures — the only fireplace ensemble with andirons on the outside of screen which protects the andirons from smoke and tarnish.

Pacific screens are made of Keystone wire in beautiful *old-gold* finish. The wire is produced by a special wet-drawn process that adds lustre and smoothness. It is of extremely uniform temper — important for quality weaving.

Pacific is the largest manufacturer of fireplace screens on the West Coast. We are proud that Keystone wire meets their exacting requirements.

KEYSTONE
MUSIC SPRING WIRE
KEYSTONE STEEL & WIRE CO. PEORIA, ILLINOIS

*Pacific Fence & Wire Co., Portland, Oregon

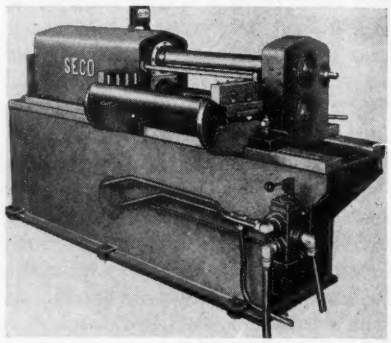
SPECIAL ANALYSIS WIRE for all industrial purposes

KEYSTONE STEEL & WIRE CO., Peoria 7, Ill.

First All Hydraulic Slitting Line Is Built by Cleveland Company

A revolutionary slitting line, believed to be the first operated entirely by hydraulic power, has been designed and built by the **Steel Equipment Company**, Cleveland, Ohio.

* * *



Hydraulic Slitting Line * * * * *

F. **Jules Keller**, President of the Company, states that the line will give perfect control over a speed range from practically zero to maximum slitting speed, plus unusual tension regulation and many other features which have long been sought in slitting operations.

* * *

ALL units of the new line are driven by fluid motors, hydraulic power being supplied by one hydraulic pumping unit using a variable delivery pump driven by a constant speed A/C motor. Volume control permits the operator to bring the speed down for threading-in operation at about 35 feet per minute. The line can easily be accelerated to top speed or slowed down without use of any brakes.

* * *

TENSION regulation of the recoil reel is easily accomplished through pressure control. Pay-off and rewind reel blocks are expanded and collapsed using hydraulic cylinders which act upon a push-pull rod. All coil handling equipment is operated by means of hydraulic cylinders.

* * *

THE line is being installed in the plant of a large Midwestern manufacturer.

* * *

New Developments in Wire and Cable Applications of Fiberglas Materials

(*Continued from page* 887)

Peterson Braid

RELATED to the binder yarn on code wire is the application of a binder yarn for the Peterson braid, employed by some manufacturers in the construction of non-metallic-sheathed building cable. Initial work done with Fiberglas indicates that its great strength will permit a very low cost, permanent binder. Dyed Fiberglas yarn may be used for circuit identification in this application.

* * *

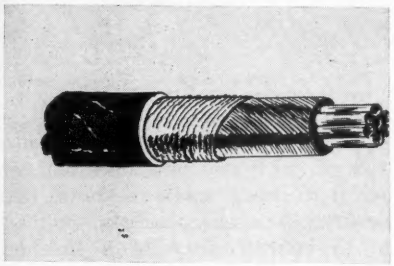


Fig. 7.—Large size rubber covered wire—Fiberglas yarn underserve. * * *

Lacquered Wires

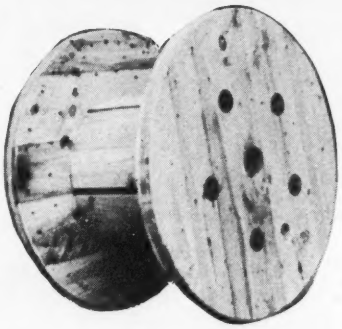
DURING the war a considerable amount of radio hook-up wire was manufactured with a Fiberglas yarn braided over the primary insulation and lacquered. The yarn contributed rot and flame resistance to the wire. These characteristics, however, had been supplied at the penalty of higher cost. The relative cost situation has reversed with the introduction of lower prices on 150's series yarns. As a result the manufacturers are again evaluating Fiberglas yarn for that type of wire.

* * *

Cable Wrap

AN interesting development in the cable tape field has been the recent introduction to varnished cloth manufacturers of a Fiberglas cloth nearly comparable in price to cotton sheeting. Initial runs by the varnished cloth manufacturers indicate that a varnished Fiberglas cloth can now be produced at a

REELS



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Furnished assembled or knocked down, made to your specifications. Will withstand severest handling. Sturdy, strong, low in cost. Made for

CABLE, ROPE and WIRE

in any size from 12″ to 96″ in diameter.

ALSO, REEL HEADS FOR STEEL DRUMS

Send us your specifications and let us quote on costs.

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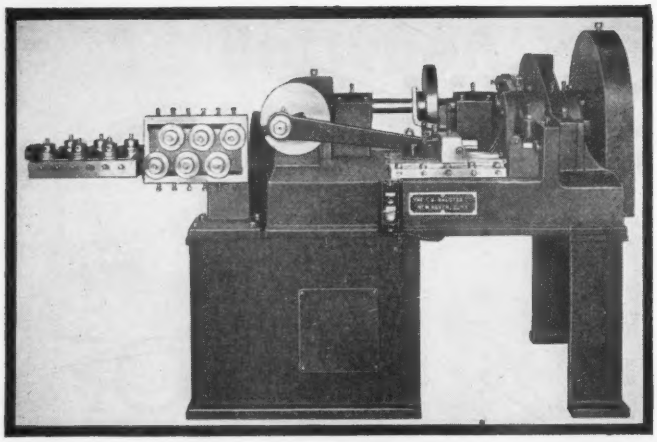
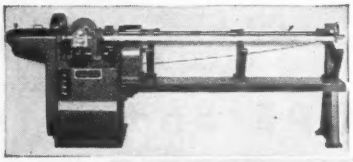


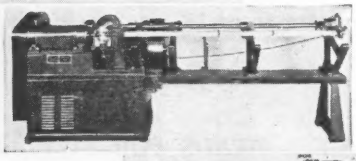
AUTOMATIC SLIDE FEED MACHINES

These machines straighten and cut round, hex, square and various other shaped stock from coils — and are especially recommended where accuracy and a square cut are very essential. The machine shown above has ⅜″ capacity with 7½″ maximum length of cut. Other sizes are also available. When writing for information, please give shape, size and kind of material to be straightened and the maximum length of cut required.

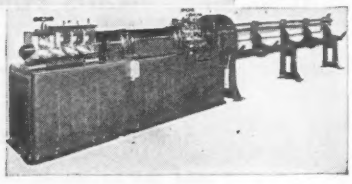
OTHER SHUSTER WIRE STRAIGHTENING MACHINES



Type 1A
1/16″ - 3/16″
Dia.



Type 2A
1/8″ - 1/4″
Dia.



Type 3A
3/16″ - 3/8″ Dia.

Type 4A (not shown)
3/8″ - 5/8″ Dia.

THE F. B. SHUSTER MFG. CO., INC.
3102 MILL RIVER STREET, NEW HAVEN, CONN.

SHUSTER SINCE 1866

Automatic WIRE STRAIGHTENING AND CUTTING MACHINES

cost approaching that of varnished cambric. The Fiberglas base product is now being evaluated by the cable industry. For years the industry has been aware of the plus values to be gained by an inorganic base varnished cloth; however, the cost difference was difficult to justify. The changed economics of the situation may now make it very practical to employ the material on many types of cable.

* * *

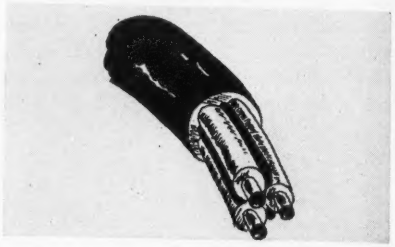


Fig. 8. — Flexible cable — Fiberglas cord tension members.

* * *

NEW uses for Fiberglas materials, as with any new development are not being made without difficulties. The characteristics adding to the performance of a finished wire or cable in some cases necessitate application techniques different from those previously used. Knowledge of the type and manner of application of impregnants best suited to Fiberglas textiles is increasing constantly.

* * *

ENGINEERING and production men of the wire and cable industry are solving the problems as they arise, and coupled with the more favorable relative costs of Fiberglas, they are using it more and more as a basic material rather than as a specialized product.

* * *

McCarthy New Philips Dealer

F. A. McCarthy, Vice-President and Sales Manager of Forem Distributors, Inc., Buffalo, recently was appointed dealer for industrial research apparatus manufactured by **North American Philips Company, Inc.**, New York.

* * *

MR. McCarthy's territory will include 14 counties in Western New York and seven counties in Northwestern Pennsylvania.

* * *

Outstanding Personalities of the Wire Industry

R. L. Wilcox, President Waterbury Farrel Foundry & Machine Company

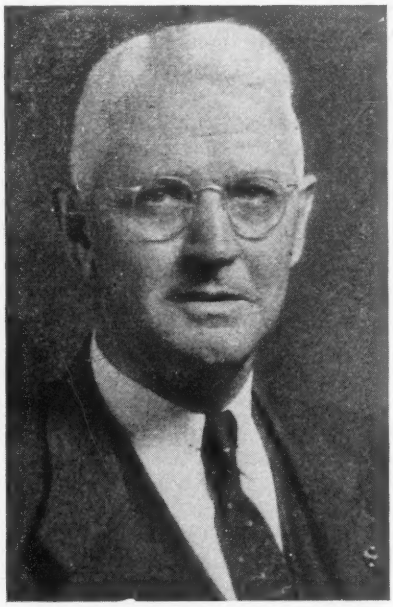
RICHARD L. Wilcox has been elected President of the Waterbury Farrel Foundry & Machine Company succeeding **David C. Griggs** who has become Chairman of the Board.

* * *

BOTH of these officials are engineers and long-term employees of the Waterbury organization, Mr. Griggs having served 54 years in various offices, first as Secretary, beginning in 1902, and later as General Manager and Vice President before becoming President in 1930.

* * *

MR. Wilcox joined the Company as a draftsman in 1898, advancing to Chief Engineer of the Bolt and Screw Machinery Division. He was elected to the Board of Directors in 1920 and became Vice President in 1928. Mr. Wilcox is a recognized authority on cold heading being widely known as an inventor of machinery for manufacturing bolts, screws, rivets and nuts. He is succeeded as Chief Engineer by Joseph M. Schaeffer who has served as Assistant to Mr. Wilcox for many years, having first joined the Waterbury-Farrel organization shortly after his graduation from Sheffield Scientific School, Yale University, in 1905.



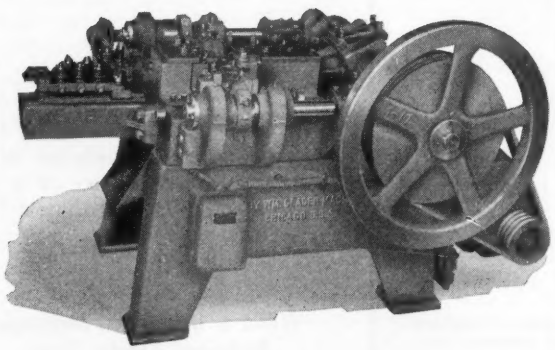
R. L. Wilcox, President Waterbury-Farrel Foundry and Machine Co., Waterbury, Conn. * * * *

* * *

Anderson Becomes President of H. Brinton Co.

W. H. Anderson, for the past twenty-two years, president and general manager of the **Fidelity Machine Company**, Philadelphia, Pa., was recently elected vice-president and a director of **H. Brinton Co.**, of the same city, manufacturers of textile machinery.

GLADER HIGH SPEED WIRE NAIL MACHINE



MACHINE ARRANGED FOR INDIVIDUAL MOTOR DRIVE

High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS

210 No. Racine Ave.

Chicago 7, Illinois

Export Dept.: 122 E. 42nd Street, New York 17, N. Y.

Alfred Marchev Elected President and General Manager Aircraft Screw Products Co.

ALFRED Marchev has been elected president and general manager of **Aircraft Screw Products Co., Inc.** of Long Island City, New York, manufacturer of helicoil and aero-thread screw thread systems. He formerly had been president and chairman of the board of Republic Aviation Corp., Farmingdale, Long Island, N. Y.

Steel Company of Canada, Ltd. Appointments

THE Steel Co. of Canada Ltd., Hamilton, Ont., announces the following staff changes: **H. M. Griffith,** recently general superintendent of the Hamilton and Ontario Works, has been named works manager of these plants. The former embodies the company's primary steel operations. **Geo. F. McAleer,** formerly assistant general superintendent, has been named assistant works manager, Hamilton and Ontario Works.

* * *

T. W. Allsworth Becomes Vice President for Intercontinental Engineers

INTERCONTINENTAL Engineers Inc., announce the appointment of **T. W. Allsworth,** (known as Ted) as Vice President in charge of Engineering and Construction.

* * *

MR. Allsworth has had a distinguished career, beginning at the University of Denver in 1912. He obtained his Bachelor's degree and his Professional degree at Carnegie Institute of Technology.

* * *

HIS active experience covers a number of years in responsible charge of mill improvement, and the mechanical equipment of the United States Aluminum Company.

* * *

LATER Mr. Allsworth served as Rolling Mill Engineer with the Aluminum Company of America and then was called to the American Rolling Mill Company of Middleton, Ohio, where he had charge of engineering the extension of the mill, the development of new processes and new products. After a period of time in this position he was put in charge of the construction of the newly organized Fabrication Division of the American Rolling Mill Company. In 1929 he became associated with the Bridgeport Brass Company as General Engineer.

* * *

IN 1946 Mr. Allsworth joined Intercontinental Engineers as Chief Project Engineer in charge of the design and construction of a very large plant for Owens-Illinois Glass Company.

* * *

Willis J. Bruninga, Manager Building Trade Sales Keystone Steel & Wire Company

WILLIS J. Bruninga has been promoted to manager, building trade sales, of Keystone Steel & Wire Co., Peoria, Ill. Mr. Brunings has been with Keystone for 18 years.

IFMA STARTS PRIZE CONTEST TO PROMOTE WRITING OF HEAT TREATING ARTICLES

The Industrial Furnace Manufacturers Association, Inc. (IFMA), 420 Lexington Avenue, New York 17, N. Y., desires to promote the publication of more and better technical articles in the trade press describing the economic advantages obtained by the use of modern industrial furnaces, kilns, and ovens. To this end, IFMA will award prizes amounting to $1,500 to the authors of the three best articles which are published in the trade press within the period specified, and which meet the following standards:

CONTEST RULES

1. Eligible articles must be published in a trade paper in the United States between October 1, 1947 and September 30, 1948, inclusive.
2. Articles must be original. Technical society papers which are subsequently published in a trade paper will be eligible.
3. Articles may be purely technical or semi-technical, but must describe specific advantages obtained by the use of modern industrial furnaces, kilns, or ovens used for heat treating, processing, or melting.
4. The equipment or processes described must be commercially operative and of benefit to users of the Industry's products.
5. Competition is open to all except those connected with the industrial furnace, kiln, and oven industry.
6. Papers shall be judged for:
   (a) Completeness and accuracy of operating data, such as fuel or electricity cost, labor costs, floor space requirements, savings in preceding or subsequent operations, material costs, etc.
   (b) Concise and complete coverage of improvements in the product, such as physical qualities, appearance, the reduction of rejects or rework, etc.
   (c) Clearness and completeness of description of equipment including size, construction, operating cycle, etc.
   (d) Uniqueness of design with regard to method of operation, material handling, heating, etc.
   (e) Completeness of description of parts treated, size, material, rate of production, etc.
   (f) In general, the ability for a possible user in the same or similar industry to apply the data to his product or operations, and to determine the possible advantages from his use of the equipment or process.
7. The following prizes will be awarded to the authors of the three best articles:

FIRST PRIZE	**$1,000.00**
SECOND PRIZE	**300.00**
THIRD PRIZE	**200.00**

   Awards of merit will be given to the publishers of the three winning articles.
8. The judges shall be appointed by IFMA, and announced before December 31, 1947. They shall not be connected with the industrial furnace, kiln, and oven industry or with any trade paper.
9. The awards will be made and checks sent to the authors of the three best articles on or before February 1, 1949.
10. The decisions of the judges shall be final.

An invitation to our readers to submit articles on the use of furnaces or ovens in the processing of wire or wire products is hereby extended by the Editor of WIRE & WIRE PRODUCTS.

Further information and copies of the rules may be secured from I.F.M.A. or from WIRE AND WIRE PRODUCTS.

Thomas to Succeed Gregory at Fiberglas

JOHN H. Thomas will succeed **George E. Gregory** as vice president and purchasing director of **Owens-Corning Fiberglas Corporation,** and **Ben S. Wright** will become Owens-Corning's general sales manager.

* * *

THESE changes, effective October 1, were announced, following word of Mr. Gregory's resignation from Owens-Corning to become president of the Morton-Gregory Company, Inc., a new organization being formed to manufacture and sell new industrial and consumer products calling for large scale use of Fiberglas yarns.

* * *

MR. **Thomas** has been Owens-Corning's vice president in charge of sales since 1946. He has been with the firm since it was organized in 1938, and prior to that time was identified with the Owens-Illinois research activities in Evansville, Indiana, Columbus, and Newark, Ohio, that resulted in the invention and development of Fiberglas air filters, insulating wool, mat and yarns.

* * *

Ben S. Wright, General Sales Manager, Owens-Corning Fiberglas Corp., Toledo, Ohio. * *

MR. **Wright** joined Owens-Corning in 1940 and was assigned to the general office sales organization as manager of the Fiberglas yarns division. In 1945 he became manager of the Fiberglas branch sales office in Cleveland. He returned to the firm's general offices in Toledo last month. Mr. Wright resides at 134 East Broadway, Maumee.

* * *

Callender's Cables Ltd. Representative now in U. S. studying American Machines & Methods

MR. **D. L. Hewitt** of Research Dept. of **British Insulated Callender's Cables Ltd.,** Prescot, Lancashire, England is now in the U. S. studying American machines and methods for the manufacture of enamelled wire.

* * *

UNION DIE ROOM MACHINERY

FOR

DIAMOND DIES

Union Ten-Spindle Vertical Polishing and Finishing Machine

Union Ten-Spindle Ripper

Union Precision Pin Grinder

Ten-Spindle Sway Machine (Pohenkra)

Twenty-Spindle Pohenkra

Union Hand—Shaping Lathe

Union Twelve-Head Wire Polisher

UNWIDIE

FOR

TUNGSTEN CARBIDE DIES

Union Ten-Spindle Light Duty Driller and Ripper

Union Precision Pin Grinder

Union Eight-Head Heavy Duty Driller and Ripper

Union One-Head Ripper (for round dies up to 1")

Union Single Head Semi-Automatic Polishing Lathe

Union Polishing and Sizing Head

Union Twelve-Head Wire Polisher

Union Four-Head Heavy-Duty Driller and Ripper

WIRE MEN THE WORLD OVER KNOW THAT UNION DIE RECUTTING MACHINES GUARANTEE MAXIMUM DIE ROOM PRODUCTION AND EFFICIENCY

For Catalogue and Information, write our New York office.

DIAMOND DIES **DIAMOND POWDER** **RECUTTING MACHINERY**

THE UNION WIRE DIE CORP.

24 Gore Street, Hamilton, Ontario
71 West 45th Street, New York City 19
375 Fairfield Ave., Stamford, Conn.
La Filiere Union, Paris, France

H. S. Christie, Manager
Atlanta, Georgia Office

John A. Roebling's Sons Company

THE appointment is announced of **H. S. Christie** as manager of the Atlanta, Ga. branch office. He replaces **C. G. Mullings,** recently retired after 45 years of service in the Atlanta territory.

* * *

CHRISTIE, who brings to his new position over twenty-two years of experience in the round wire field, has been associated with the Roebling Company since 1945 as assistant manager of sales in the Wire and Cold Rolled Products Division. With Mrs. Christie and their two children, he intends to reside in Atlanta.

* * *

Oscar Semler
Consulting Production Engineer
Melbourne, Australia.

THE report on **World Wide Wire Industry** conditions (**Australia** and **Czechoslovakia**), for the meeting in Chicago, was written by **O. Semler,** Consulting and Production Engineer, in Melbourne, Australia.

* * *

Oscar Semler, Consulting Production Engineer, Melbourne, Australia. * * * * *

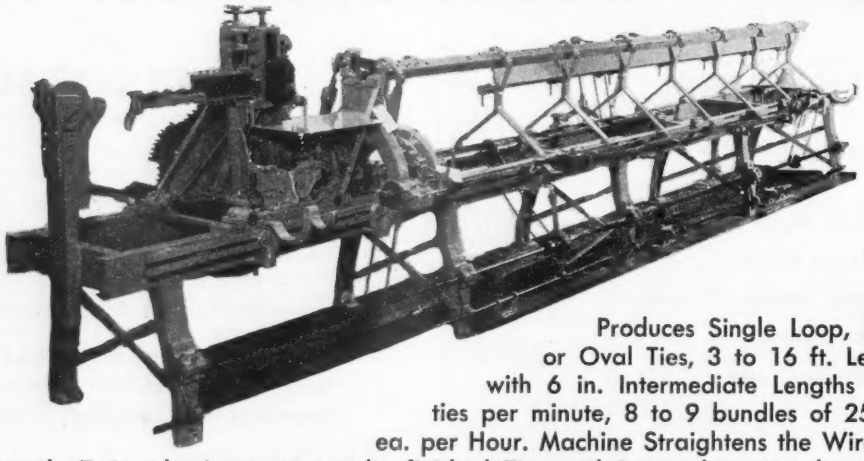
STARTING as Chief Engineer in forging works in the west of Bohemia:— Associated with the erection of wire mills. As Works Manager, introduced a very extensive manufacturing programme. — All kinds of special steel wire, spring steel wire, patented steel wire, tempered and hardened steel wire, high carbon and alloyed steel wire, non-ferrous wire. Wire nails, tacks, rivets, chains, wire mesh, wire gauze, mosquito wire and fly wire, wire netting, spokes for bicycles and motor cars; a great variety of pins, safety pins, crochet hooks, bobby pins, umbrella sets; and also a large variety of different wire articles.

* * *

RESPONSIBLE for the design and erection of modern steel works, and wire rod rolling mills, in the brown coal mining district in the north of Bohemia: Works Manager and afterwards member of the Board of Directors of the Works.

* * *

MAKE STEEL WIRE BALE TIES WITH THIS REMARKABLE MACHINE



Produces Single Loop, Round or Oval Ties, 3 to 16 ft. Lengths, with 6 in. Intermediate Lengths — 37 ties per minute, 8 to 9 bundles of 250 ties ea. per Hour. Machine Straightens the Wire, cuts it to length, Twists the Loop, counts the finished Ties and Drops them into bundles of 250 Wires. Equipped for tight-and-loose pulley drive.

Send For Prices & Particulars.

REED and RICHARDS TRANSATLANTIC, INC.

CHANIN BLDG., 122 EAST 42nd ST., NEW YORK 17, N. Y., U.S.A.
REG. CABLE ADD.: "LOUREED, NEW YORK".
Also: STAPLE CUTTING MACHINES MAKING FENCE & POULTRY NETTING STAPLES

INSTALLED the first revolving open hearth furnace in the Steel Works in Central Europe. Successfully converted the gas fire rolling mill furnaces. It was the first furnace of this kind operating on powered brown coal in Czechoslovakia.

* * *

MEMBER of the Executive Committee of the Works. Associated with modernizing of Wire Industry in Australia.

* * *

David E. Washburn, Chemist, Dies

DAVID E. Washburn for 25 years chemist for the Warner Company in Bellefonte died Saturday, September 20, 1947, as the result of a heart ailment.

* * *

DAVID Eroh Washburn was a son of David and Susan Eroh Washburn and was born at White Haven, near Wilkes-Barre, on March 3, 1883. Surviving are his wife, the former Artie Keller and a stepson, Charles Keller, of Bellefonte, and three grandchildren.

* * *

MR. Washburn came to Bellefonte following his graduation from Penn State in 1906. He was a member of St. John's Evangelical and Reformed church and was a member of the Bellefonte Elks Lodge. For some time he had been a member of the lime committee of the American Society of Testing Materials and for several years past has been active in the affairs of the Wire Association.

* * *

A. G. Bussmann

MR. A. G. Bussmann of the Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation died October 7th, at the age of 61.

* * *

MR. Bussmann was long associated with the steel industry. In 1908, he started his career in the Homestead Plant of the Carnegie Steel in Homestead, Pennsylvania. Before his connection with Wickwire Spencer Steel Company, he was Chief Chemist of the Donora Steel Works of the American Steel and Wire Company and President of the Standard Steel and Wire Company, of Greensburg, Pennsylvania.

* * *

HE was associated with the Wickwire Spencer Steel Company since 1931 and was successively Manager of the Wire and Spring Departments, Sales Manager of the Buffalo District, Assistant to the President and General Sales Manager. At the time of his death, he was in charge of sales of the Wickwire Divison.

* * *

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for the
1947 WIRE BUYERS GUIDE

RUGGED-DEPENDABLE-ADAPTABLE

CONTINUOUS VULCANIZING MACHINE

ROYLE PRODUCTS

Continuous Extruding Machines for the Rubber, Plastic and Chemical Industries
Continuous Vulcanizing Machines for Rubber Insulated Wire
Plastic Insulated Wire Machines
Light Wire and Cable Capstans
Strainers Motorized Take-Ups
Cooling Troughs Temperature Control Units

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — REgent 2430
Home Office — E. B. Trout J. W. VanRiper — SHerwood 2-8262
Akron, Ohio — J. C. Clinefelter — JEfferson 3264
Los Angeles, Cal. — H. M. Royal, Inc. — LOgan 3261

PATERSON 3, NEW JERSEY

A Review of Recent Wire Patents

No. 2,426,858, INSULATED CONDUCTORS HAVING FABRIC LAYERS IMPREGNATED WITH ESTER GUM SATURANTS, patented September 2, 1947 by Samuel E. Brillhart, Lutherville, and Alvin N. Gray, Joppa, Md., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

About the wire conductor is a layer of insulation, a layer of textile material impregnated with a plastic mixture consisting of unconverted ester gums and a semi-drying oil surrounding the layer of insulation, a plastic coating consisting of unconverted ester gums, blown soy bean oil and a pigment surrounding the impregnated textile layer, and an outer coating of colored cellulose lacquer.

* * *

No. 2,427,079, UNWINDING and COUNTING APPARATUS, patented September 9, 1947 by Rudolph G. Werth, Oak Park, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The apparatus is adapted to determine the number of strands of wire wound on a core and includes a device encircling the core for unwinding one turn of strand for each revolution of the device and a takeup of the unwound strand also encircling the core and movable in the same direction but at a slower speed than the unwinding device.

* * *

No. 2,427,196, BONDING OF VULCANIZABLE COMPOSITIONS TO METALLIC SURFACES, patented September 9, 1947 by Thomas K. Cox, Randallstown, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

This patent, contains 14 method and article claims. The wire conductor is coated with a thin film whose active ingredient is an ester of one of the following: Dibutyl phthalate, tricresyl phosphate, amyl acetate, ethyl acetate, butyl acetate, ethyl acetoacetate, methyl benzoate, methyl salicylate, triethylene-glycol-di-2-ethyl butyrate, and triethylene-glycol-di-2-ethyl hexoate.

* * *

No. 2,427,197, BONDING OF RUBBER AND RUBBERLIKE COMPOSITIONS, patented September 9, 1947 by Thomas K. Cox, Randallstown, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Here it is not the ester, but one of the group of the compounds in patent No. 2,427,196, which is employed. Associated therewith is another vulcanizable compound containing polymerized chloroprene as the vulcanizable agent. There are 16 claims to the article and method.

* * *

No. 2,427,198, CONDUCTOR INSULATED WITH RUBBER COMPOUND LAYERS BONDED TOGETHER, patented September 9, 1947 by William P. Frisco, Dundalk, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Here the compound is one of the esters named in patent No. 2,427,196 but a second body made of rubber is placed in contact with the ester film, and the body and film are subjected to sufficient heat and pressure to form a bond.

* * *

No. 2,427,248, UNCOILER, patented September 9, 1947 by Earl R. Backus, Glassport, Pa., assignor to Carnegie-Illinois Steel Corporation, a corporation of New Jersey.

For supporting a coiled strip during an uncoiling operation, the inventor provides a housing, a coil-engaging device rotatably mounted with respect to the housing, a pump driven by this coil-engaging device to apply back tension to the strip, a friction brake for the coil-engaging device, and means operable at low speeds of the strip for applying the friction brake.

* * *

No. 2,427,507, METHOD OF PRODUCING SEALED CABLES, patented September 16, 1947 by George M. Powell, 3rd, South Charleston, W. Va., and

Complete Description and Drawings of Patents May Be Had for 50 cents, outside the United States and Canada $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

BUT...

It would appear absurd on our streets now — compared with the beautifully designed — high-powered models of the present. In the iron and steel industry — a little

Rodine*

added to the Sulfuric or Muriatic acid bath — marks an equally advanced and revolutionary improvement in pickling technique.

"RODINE" effects more precise control and saves good metal by lessening acid attack and the chances of over-pickling and hydrogen embrittlement. "RODINE" prolongs the life of the bath — saves acid — holds fumes to a minimum — facilitates scale removal. For better pickled surfaces and all around high quality performance — use "RODINE."

* "RODINE" ® for Acid Inhibitors

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING

Granodine *
Duridine *
Alodine *
Lithoform *
Thermoil-Granodine *

RUST REMOVING AND PREVENTING

Deoxidine *
Peroline *

PICKLING ACID INHIBITORS

Rodine * ®

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

Joseph E. Brister, Summit, N. J., assignors to Carbide and Carbon Chemicals Corporation, a corporation of New York.

This method is patented for sealing the interstices of flexible electrical cable containing stranded wires insulated with plasticized vinyl chloride resins.

* * *

No. 2,427,727, LEADING-IN WIRE, patented September 23, 1947 by Charles N. Huntley, University Heights, and John A. Campbell, Willoughby, Ohio, assignors to General Electric Company, a corporation of New York.

A stranded conductor of copper or silver is provided, with a solid conductor of tungsten or molybdenum, a substantial length of one end of the individual strands of the first-named conductor each having thereon a uniform plating of nickel whereby the end of the conductor is rendered rigid and the individual strands are bonded together solely by the plating, the plated end of the stranded conductor being butt-welded to an end of the solid conductor with a quantity of the nickel metal fused to and around the adjacent ends of both conductors.

* * *

No. 2,428,259, NAIL, patented September 30, 1947 by Edgar P. Anstett, Chicago, Ill., assignor of twenty per cent to Carl J. Anstett and twenty-five per cent to Dolly Anstett, both of Chicago, Ill.

The nail is one adapted to be stacked with others like it for insertion in a nailing machine, and has a shank having burrs formed on two opposite sides thereof, the other two opposite sides being flat and each having crosswise extending grooves formed therein.

* * *

No. 2,427,282, WOUND ARMATURE FOR ELECTRIC MACHINES, patented September 9, 1947 by Vaino A. Hoover, Los Angeles, Calif., assignor to Electrical Engineering and Manufacturing Corporation, Los Angeles, Calif., a corporation of California.

More specifically the method is adapted for winding an armature for a dynamo-electric machine having x poles, n armature slots and n commutator riser slots, which consists in dividing the armature slots into x sequential groups, dividing the commutator riser slots into x sequential groups each of which is aligned with one of the groups of armature slots, winding the slots of alternate groups, and finally winding the slots of the groups intermediate the alternate groups, each winding being made by leading a wire from a commutator riser slot to and through the armature slot which is spaced n/x slots away from the commutator riser slot then to and through the armature slot aligned with the commutator riser slot, and then into the commutator riser slot.

New Trade Mark Law

Royal R. Rommel*

A new Federal trade-mark law went into effect July 5, 1947. Under it very substantial advantages are granted by the U. S. Government to those who protect such property by means of Federal registration.

* * *

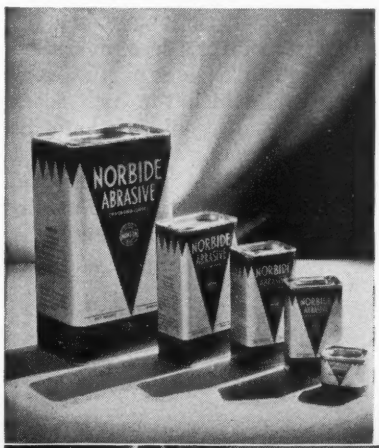
THE law is quite complex. However, it now grants protection not only upon trade-marks actually used upon articles sold in interstate commerce, but it also gives the owner of other good will symbols, distinctive packaging, etc. protection which did not heretofore exist under Federal statutes.

* * *

THE things that the owner of a trade-mark or other good will property should promptly do are as follows:

1. **Forward to your trade-mark counsel for his opinion all of the pamphlets, circulars, packages, trade-marks and descriptive matter relating to your business. That is true in connection with a business merely rendering services, as well as a business which sells a commodity.**
2. **If a Federal registration has already been secured upon a trade-mark, this registration should claim the benefits under the new Act, because five years from the date when the benefits of the Act are granted, the mark becomes incontestable, provided the mark is maintained in use during that five year period and is not abandoned. Certain formal affidavits filed at the end of the five year period are necessary.**
3. **Anyone owning a service mark not necessarily connected with the sale of a commodity; a slogan, distinctive packaging, and other symbols and industrial property having some good will value can be protected under the Act.**
4. **If an application for registration of a trade-mark is pending at the present time it should be amended to conform to the provisions of the new Act.**
5. **The present Act provides for the registration of similar marks used by competitive businesses within the United States, in different territories.**
6. **Collective and certification marks are now registerable. Such marks are sometimes used to indicated regional or other origin, material, mode of manufacture, quality, accuracy or other characteristics of goods or to indicate membership in an association or other organization.**

*Lancaster, Allwine & Rommel, Patent and Trade Mark Attorneys, Washington, D. C.

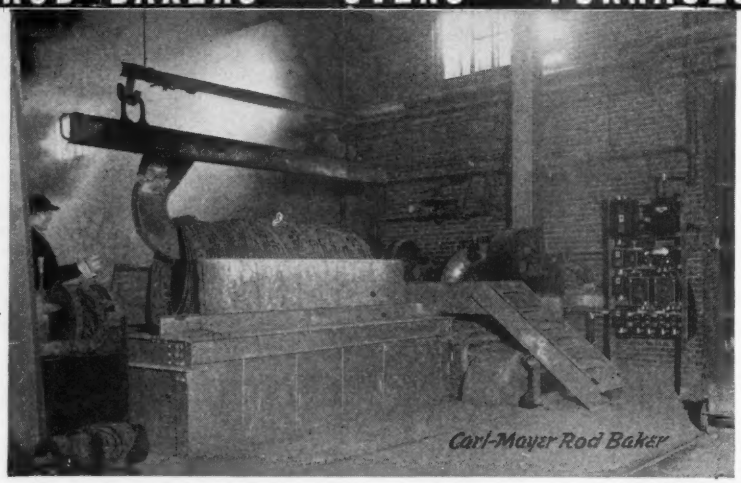


NORBIDE ABRASIVE
For Cemented Carbide Dies

NORBIDE Abrasive is successfully used for cutting and semi-finishing cemented carbide wire drawing dies. This abrasive is second only to diamond powder in hardness and is 150 times less expensive. Sizes 220 and 240 for ripping; 320F for semi-polishing; 500 to 800 for final finishing.

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

MORE PRODUCTION *with* CARL-MAYER HI-SPEED ROD BAKERS - OVENS - FURNACES



Patented

TYPICAL HI-SPEED ROD BAKER — DIRECT OR INDIRECT HEAT — ANY FUEL
WRITE for BULLETIN No. 241

Growing interest in our type of equipment is evidenced by Carl-Mayer installations for such plants as:—

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Atlantic Wire Co.
Atlas Steel Co.
Atlas Tack Corp.
California Wire Cloth Corp.
Eaton Mfg. Co.
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Steel Co. of Canada
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THE CARL-MAYER CORPORATION
3030 EUCLID AVENUE
CLEVELAND, OHIO

Salt Bath Annealing Proves Fast and Versatile

(*Continued from page* 884)

sufficiently for cold drawing and subsequent cold forming. Annealing at temperatures around 1550 degrees to 1600 degrees F., with controlled cooling rates to produce definite structures, does not seem very practicable due to the very slow rate at which the bath cools. Desirable results could no doubt be had by operating two furnaces, moving steel from the high heat furnace to transform isothermally in another at lower temperature.

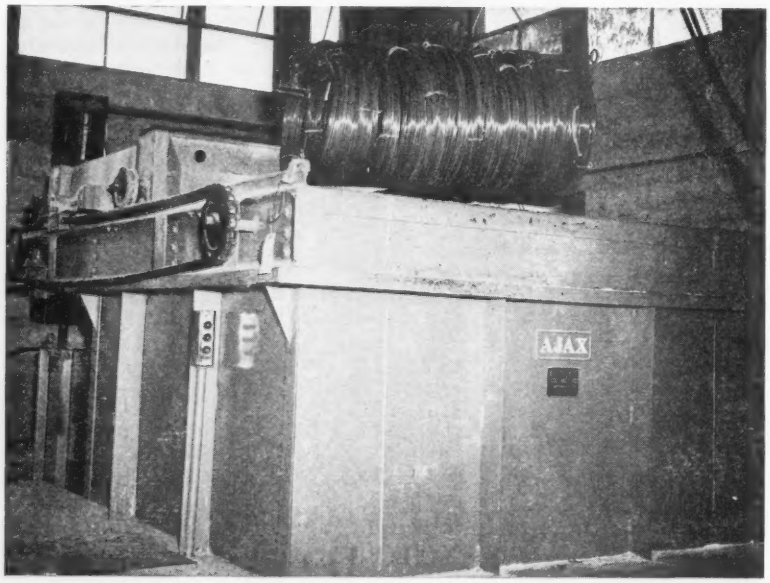


Fig. 2. — Furnace With Average Size Charge

* * * * *

World Wide Wire Industry
Czechoslovakia

(*Continued from page* 900)

TOTAL Wire and Wire products manufactured 120,000 tons. A very large proportion of the latter was exported. All the Czech Wire Mills were members of the I.W.E.C.O.

* * *

Development in 1939

THE occupation of the country by the Germans brought about a considerable reduction in output of the Steel Works, and the Wire Works, in the east of the Republic. However, in the course of the War, the most important Steel Works and Rolling Mills, and some of the Wire Plants, situated in the west of Germany, suffered considerable bomb damage and their output was reduced accordingly. The Czechoslovakian Steel and Wire Industry had to make up for the loss of production. The Germans did their utmost to make up for output losses in the west, and the grip they had on the Czechoslovakian industries was only eased slightly by the workers' passive resistance.

* * *

THE German occupation ended, practically the entire Steel and Wire Industry was nationalized by the Government of the liberated country. Since then, rehabilitation of the Industry in general, and also the reorganization of the Czechoslovakian Wire Industry, has made progress. The greatest difficulties were, and still are, a tremendous shortage in manpower, and short supply of raw and auxiliary materials. Whilst the country had escaped serious damage, it had suffered greatly from an almost complete lack of maintenance, and therefore from detorioration of plant and machinery, during the war years. I think it is likely to take some time before pre-war production figures can again be reached.

* * *

ON the other hand, the most efficient competitors of the export market—the German Wire Plants in the Ruhr and the Rhineland—are out of the race, at least

for the time being. It remains to be seen whether the Czechoslovakian Industry will be able to fill the gap in the demand in future.

* * *

Non-Ferrous Metal Wire Industry

THE home market is being supplied by local works. These have never been particularly efficient. The lack of raw material may have been a considerable factor in limiting the productivity and quality of the output of these plants. However, the main Cable Manufacturing Factory, situated in Slovakia, supplies most of the State's demand.

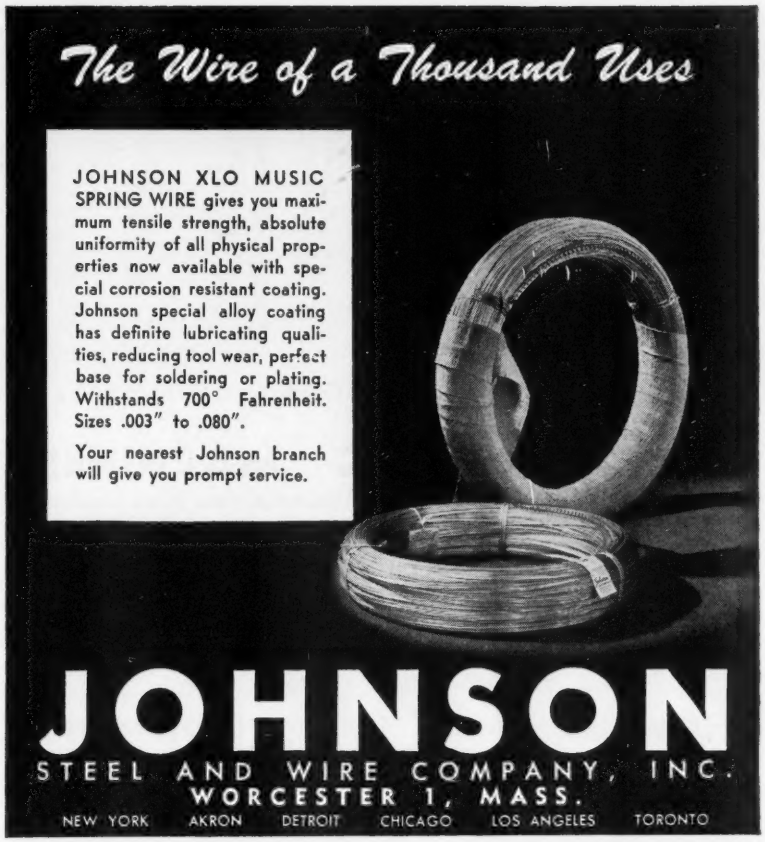
* * *

IT is difficult to form a precise judgment of the prospects of Czechoslovakia's Steel and Wire Industry. The production methods, technically, are advanced, and the Czech operatives are efficient and well-trained. However, the whole of Czechoslovakia's economy, in normal times, has always been dependent on the economical set up in the whole Europe. Also, the transport problem is one fraught with difficulties, the main problem being transport to the exporting sea-ports. Before the War, it was often only possible to keep up export of important goods, at the cost of the standard of living of the Czech workers. It is unlikely that such economies could be employed for the future. An intensified production campaign and further improvement in production methods, together with a sound foreign trade policy, could however, contribute towards the advancement of the economic position of this most important Industrial community in Central Europe.

Germany

(*Continued from page* 903)

short of 1938. The output this year will be probably a little above 1938. Czecoslowachia is exporting to the Balkans, but not yet to Overseas or Western Europe. It is estimated that in 1947 a total quantity of 15.000 tons will be exported (1946 12.000 tons). The Austrian wire and wire products output is negligible and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STATEMENT OF OWNERSHIP, management, circulation, etc., required by the Acts of Congress of August 24, 1912 and March 3, 1933, of Wire & Wire Products published monthly at New York, N. Y., for October 1, 1947.

State of Connecticut, County of Fairfield, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared Richard E. Brown, who, having been duly sworn according to law, deposes and says that he is the President of Wire & Wire Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publishers, editor, managing editor, and business managers are:

Publisher, Quinn-Brown Publishing Corporation, 300 Main St., Stamford, Conn.; editor, Richard E. Brown, 300 Main St., Stamford, Conn.; managing editor, none; business manager, Richard E. Brown, 300 Main St., Stamford, Conn.

2. That the owner is: (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern its name and address as well as those of each individual member must be given.) Quinn-Brown Publishing Corporation, 300 Main St., Stamford, Conn.; Richard E. Brown, 300 Main St., Stamford, Conn.; Leta B. Brown, Montecito, California, and Ruth S. Spengel, Shore Front Park, South Norwalk, Conn.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none so state.) None.

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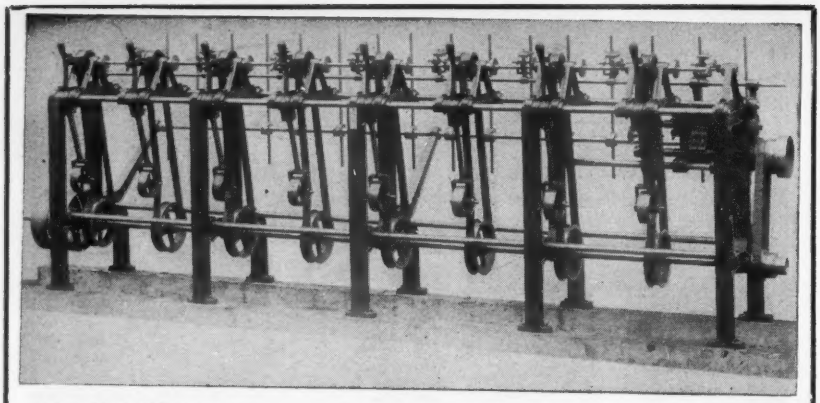
RICHARD E. BROWN
(Publisher)

Sworn to and subscribed before me this 4th day of September, 1947.

H. E. HOWARD,
Notary Public.

My commission expires April 1, 1952.



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will reach hardly 14.000 tons in 1947. This is only 18% of the 1937 figure. Most of the machinery of the Styrian wire works has been dismantled and sent to Russia. Austria does not export but is in need of some 25-30.000 tons of nails, barbed wire and fencing wire.

* * *

THE German production of non-ferrous metal wires has been, during the first half of this year, approx 28% of the existing capacity, which is 60% of what it was 1938. All the non-ferrous metal wire plants of the Russian zone have been nationalized. No such wires are being exported. The shortage in Germany is so great, that no repairs in Power transmission lines are possible at present. The production of aluminum wires has been stopped since 1945 and will not be revived in the near future.

* * *

An Investigation of Tempered Chrome-Silicon Spring Steel

(*Continued from page* 895)

this grade of wire. In fact this selection is borne out by results shown in the room temperature tests.

* * *

IN all cases we have employed the optimum temperature for elevated temperatures which has been found to be 800°F. and the majority of the data are for a 2 hour blue. All springs were subjected to elevated temperatures of 400°F., 500°F., and 600°F. for periods of 72 hours. The 72 hour time was selected so that the data might be correlated with that for other grades of spring steels as reported by Zimmerli. However, unlike Zimmerli, we have studied these springs without benefit of setting our springs solid after bluing and we have employed load corrections, hence stress corrections, to compensate for the change in the torsional modulus with temperature.

* * *

A series of tests have been conducted to determine the effect of bluing time on the per cent

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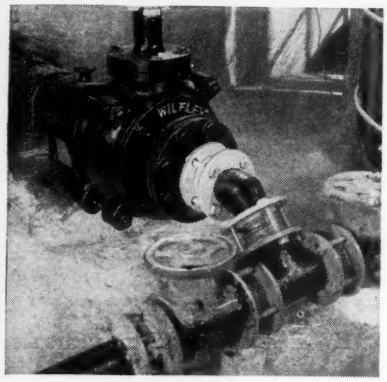

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loss in load. For these tests we used a corrected stress of 100,000 psi at 400°F. for 72 hours with bluing time of 30 minutes and 2 hours at 800°F. for the three hardnesses of steels. The results are shown in Table B. (Page 895).

* * *

IT may be clearly observed from the table that neither the per cent loss in load nor hardness is noticeably changed for the 48.5 and 50 Rockwell C levels as a result of either a 30 minute or a 2 hour blue at 800°F. However, it would be well worth while to employ a 2 hour blue at 800°F. for the 52.5 Rockwell C springs in order to achieve the optimum properties at elevated temperatures. It is believed that this behavior may be explained on the basis of the hardness survey of the material.

* * *

THE noted change in shape of the tension stress-strain curve as a function of the bluing temperature is definitely associated with the hardness of the tempered wire. For any one particular hardness level neither microstructure nor hardness suffers any solution to account for the change, but an X-ray is contemplated in an effort to account for the behavior. The change in the stress-strain relationship is reflected in the mechanical properties of the blued spring wires in that the elastic limits of the 48.5 and 50 Rockwell C wires blued at 500°F., 600°F. and 700°F. are higher than the values for the similarly blued 52.5 Rockwell C wire. The optimum bluing temperature for the spring wires is identical to that employed for the room temperature springs. The Rockwell C 52.5 springs exhibit the optimum spring properties under room temperature conditions. The most desirable bluing temperature is 700°F.

* * *

LOAD-DEFLECTION curves of springs from the three hardness levels studied shows that there seems to be a definte ratio existent between torsional elastic limit of the springs and the tensile strength of the blued spring wire. Further study is contemplated to determine if this ratio exists for other grades of spring wire.

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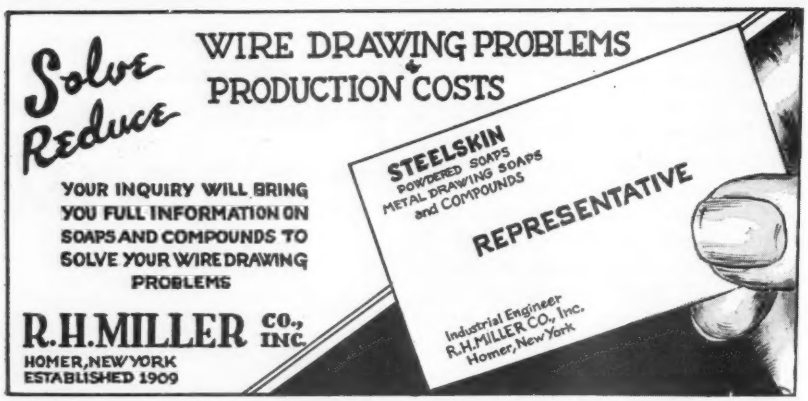

ELEVATED temperature spring tests show that the optimum properties are associated with the Rockwell C wire; however, 48.5 Rockwell C wire is only slightly inferior. An anomaly exists for the 52.5 Rockwell C wire in that both the 400°F. and 500°F. results are identical, but it is felt that the hardness survey explains the behavior.

* * *

FOR the elevated temperature conditions studied, chrome-silicon (50 Rockwell C) is superior to SAE 6150. This is quite interesting when it is realized that SAE 6150 has definite advantages due to the following factors: (a) 350°F. test temperature for the SAE 6150 vs. 400°F. for chrome-silicon; (b) all SAE 6150 springs were set solid after bluing while chrome-silicon springs were not given this treatment and (c) all chrome-silicon springs were corrected for the change in torsional modulus of elasticity due to temperature change while the SAE 6150 springs were not so corrected. This correction alone could well account for as much as 5 per cent in stress to the disadvantage of the chrome-silicon springs.

* * *

Labor Relations

(*Continued from page* 904)

fuse to compromise on any detail in his fight against the **Taft-Hartley** Act, has won widespread rank and file support from union workers everywhere. They predict that as court rulings and injunctions bring home to the workers the serious nature of the **Taft-Hartley** law's effect on their organizations, they will turn to Lewis for leadership in increasing numbers.

* * *

LEWIS, through all the years since he left the Congress of Industrial Organizations, has kept alive on paper at least his Labor's Non-Partisan League.

* * *

IT is pointed out that if negotiations for unification of the AFL and CIO bog down as they show every sign of continuing to do, Lewis now has a powerful weapon with which to start a "unification drive" of his own, with the Non-Partisan League playing the central role.

* * *

IF such a plan should come to fruition, Lewis instead of writing off District Fifty and thereby eliminating much of the inter-union jurisdictional strife of the last ten years, would be invading the fields of scores of other AFL and CIO unions with an attempt to win them over.

* * *

SUCH action, of course, would cause reprisals. It is too early to say whether Lewis will go through with the plan. But persons close to him insist that it is something worth watching.

* * *

SUCH jurisdictional strife in the field of wire and wire products manufacture which already is crossed by so many jurisdictional lines, would have very serious consequences for production.

* * *

Wean to Build New Plant

THE **Wean Engineering Company** announces that it has started construction of a fabricating and assembly plant to be constructed on property on Ratiliff Road adjoin-

ing the main line of the Erie Railroad.

* * *

THE plant is to be used for the fabrication of materials which can not be obtained from the company's normal suppliers. In addition, it will be used for the assembly of export shipments of the sheet, tin and strip mill machinery manufactured by The Wean Engineering Company. The company has done a large, world-wide export business, and the export demand is increasing at this time.

* * *

THE main building will be 200 feet long by 60 feet wide, and will be equipped with a 25-ton crane. Attached to it will be a lean-to 40 feet wide running the full length of the main bay. It is hoped that the plant will be ready for occupancy early in 1948.

* * *

THIS plant will augment the company's facilities in Cleveland, Youngstown, and other districts. The Wean Equipment Corporation in Cleveland and The McKay Machine Company in Youngstown are two concerns in which The Wean Engineering Company has large interests.

Digest of Articles on Diamonds

THE Industrial Diamond Information Bureau, Industrial Distributors (1946) Ltd., St. Andrew's House, 32-34, Holborn Viaduct, London, E.C.I., publishes monthly a bulletin containing abstracts of articles dealing with properties and industrial applications of diamond: together with notices of patents and patent applications in many States. A copy of this bulletin may be obtained, free of charge. on application to the above address.

Rustless Iron or Steel

EUROPEAN patents, just beginning to be reported in American journals, describe several new uses for glycerine. One such Dutch patent, 53,993, granted to **V. V. Gruno** and **Adek Rijivielen Fabrieken,** presents a method for making rustless iron or steel. In this process the cleaned article is dipped in a solution containing zinc, phosphoric acid, and glycerine. To make a bath, 110 liters of water are mixed with a dough made of 833 Gm. of phosphoric acid and 300 Gm. of zinc. This is allowed to stand for several hours. Then 143 Gm. of glycerine (28°Be.) is added. The bath is used at 95°C. for 12 minutes.

Booklet on Aluminum Temper Designations

A fourteen-page booklet giving the temper designations that will be used by the **Aluminum Company of America** after **January 1, 1948,** has been issued.

* * *

RAPID metallurgical advances and improved fabricating technique has made a new temper designating system necessary.

* * *

THE booklet covers non-heat treatable alloys, sheet and plate, extrusions, wire, rod and bar, tubing, forgings and rivets. It will be of value to all who are working with aluminum and its alloys.

* * *

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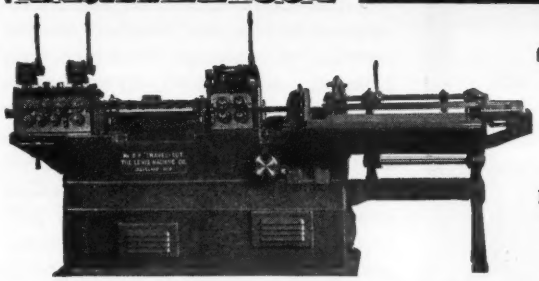

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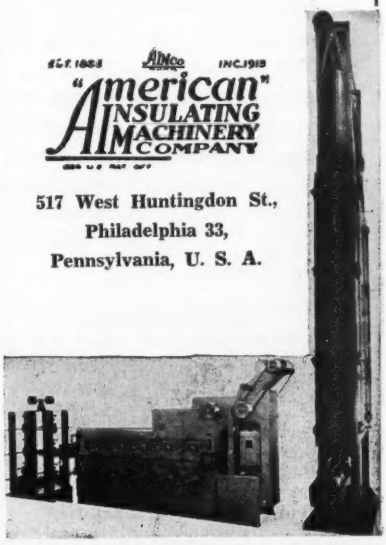

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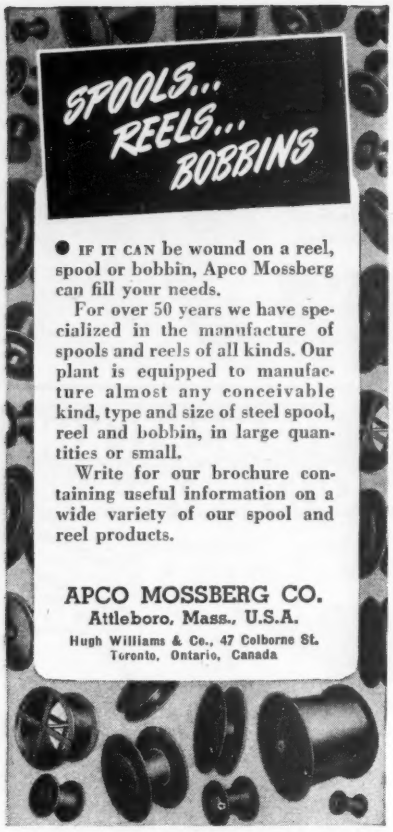
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* * *

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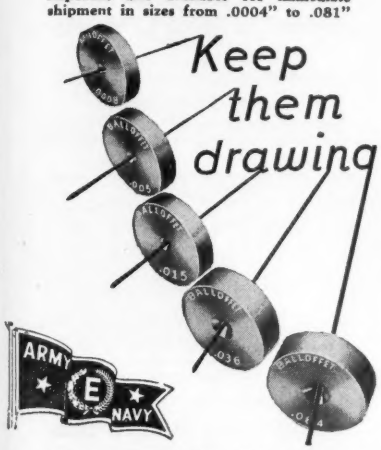

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New Standard Catalog

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* * *

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* * *

A number of additional revised standards approved since the January 1947 issue of all American Standards are included.

* * *

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(*Continued from page* 890)

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COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H. Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Pacific Coast Borax Corp., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery Inc., Pawtucket, R.I.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N.J.
Champion Diamond Co., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N.Y.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Champion Diamond Co., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N.Y.
Union Wire Die Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND TOOLS—
Rusch Wire Die Corp., Croton-on-the-Hudson, N.Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N.J.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N.Y.
Union Wire Die Corp., New York, N. Y.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Lead Extrusion
Eastern Tungsten Carbide Co., Newark, N. J.
Wayne Wire Die Co., Hillside, N. J.
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N.J.
Carboloy Co., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Eastern Tungsten Carbide Co., Newark, N. J.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Michigan Wire Die Co., Detroit, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N.Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N.J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Tungsten Carbide Co., Newark, N. J.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N.J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstoyn, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N.Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N.J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, Ohio.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N.Y.
Tungsten Alloy Mfg. Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIRECT ELECTRIC RESISTANCE HEATING—
Trauwood Engr. Co., Cleveland, Ohio.

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N.J.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro. Mass.

DRYING & PRE-HEATING ROOMS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.

DRYING EQUIPMENT—
Carl-Mayer Corp., The, Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N.Y.

ENGINEERS—Consulting Wire Mill
Lewis, Kenneth B., Worcester, Mass.
Syer, C. Raymond, Westport, Conn.

EQUIPMENT—Insulation Testing
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros., & Co., The, Waterbury, Conn.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M. Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

WHERE TO BUY, Continued

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Furnace Engineers Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Hard'ing & Temp'ing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., The, Cleveland, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corporation, Toledo, O.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corporation, Toledo, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of Cleveland.
Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M. Co., Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
Industrial Ovens, Inc., Cleveland, Ohio.

INSULATING MATERIALS—
Crepe-Kraft Co., Newark, N. J.
Du Pont de Nemours, E. I., Co., Wilmington, Del.
Owens Corning Fiberglas Corp., Toledo, O.
Standard Varnish Wks., Staten Island, N. Y.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, H. & G., Tool & Mfg. Co., Montclair, N.J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Machine Co., Waterbury. Conn.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bale Tie
Reed & Richards Transatlantic Inc., New York, N.Y

MACHINERY—Braiding
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Brazing
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Rope Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Entwistle, Jas. L. Co., Pawtucket, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Coilers
Eisler Engineering Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (used), New York, N. Y.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Machinery Inc., Pawtucket, R. I.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Mach'y Co., Phila., Pa.
National Machinery Exchange (used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
National Mach'y Exch. (Used), New York, N.Y.
Porter, H. K. Inc., Everett, Mass.
Shuster, F. B. Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Die Making
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Roos, H. & G., Tool & Mfg. Co., Montclair, N.J.
Union Wire Die Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Edging
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
Robertson John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R. I

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Forming
Eisler Engineering Co., Newark, N. J.
National Mach'y Exch. (Used), New York, N.Y.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Reed & Richards Transatlantic Inc., New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Pawtucket, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail, Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

WHERE TO BUY, Continued

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rod Mill
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
National Mach' Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rubber for Insulating Wire
Royle, John & Sons, Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Screw Wire
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Boyd Charles P., Corp., Philadelphia, Pa.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
National Mach'y Exch. (Used), New York, N.Y.
Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Spring Making
National Mach' Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Reed & Richards Transatlantic, Inc., New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Lewis Machine Co., The, Cleveland, Ohio.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Stranding
Hughesville Machine & Tool Co., Hughesville, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Ruesch, H. J., Machine Co., Newark, N. J.
Steel Equipment Co., Cleveland, Ohio.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Swaging
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Testing Equipment—Sparkers
Entwistle, Jas. L., Pawtucket, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila, Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila, Pa.
Boyd Charles P., Corp., Philadelphia, Pa.
Eisler Engineering Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wood Screw
National Mach'y Exch. (Used), New York, N.Y.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Torrington Mfg. Co., Torrington, Conn.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.

NAILS & STAPLES
Pacific Atlantic Steel Corp., Los Angeles, Calif.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Dehydrogenizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Ross, J. O., Engr. Corp., New York, N. Y.

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.
Ross, J. O., Engr. Corp., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER—For Coil Wrapping and Corrosion Prevention
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott Testers, Inc., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D.C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Sauereisen Cements Co., Pittsburgh, Pa.

PIPES & FITTINGS—Acid Resistant
Ceilcote, Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland Ohio.

POTS—Lead Melting
National Annealing Box Co., Washington, Pa.
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STAND—
Industrial Ovens, Inc., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Boyd, Charles P., Corp., Philadelphia, Pa.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Collapsible
Entwistle, Jas. L. Co., Pawtucket, R. I.

WHERE TO BUY, Continued

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., Hazardville, Conn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wooden
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N.Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Younstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machy, Inc. Pawtucket, R. I.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

SHIPPING TAGS—
Pacific Atlantic Steel Corp., Los Angeles, Calif.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H. Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Ovens, Inc., Cleveland, Ohio.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Company, Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Company, Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp.,

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Company, Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

SPRINGS—Tools for Forming
State Machine Tool Co., Hartford, Conn.

STAMPINGS—Steel
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., Paterson, N. J.

TANK LININGS—Brick
Ceilcote Co., The, Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.

TANK—Compound
Haveg Corp., Newark, Del.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
National Annealing Box Co., Washington, Penna.

TOOLS—Spring Forming
State Machine Tool Co., Hartford, Conn.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRAVERSES—For Reels
Entwistle, James L. Co., Pawtucket, R. I.
Hubbard Spool Company, Chicago, Ill.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machy, Inc. Pawtucket, R. I.

TREADS—Safety
Norton Co., Worcester, Mass.

TUBE BENDERS AND FORMERS—
Ruesch, H. J. Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—For Insulation
Standard Varnish Wks., Staten Island, N. Y.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y, Co., Phila., Pa.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machy, Inc. Pawtucket, R. I.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Malin & Co., Cleveland, Ohio.

WIRE—Barbed
Pacific Atlantic Steel Corp., Los Angeles, Calif.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio.

WIRE—Enameled for Coils
North American Philips Corp., Dobbs Ferry, N.Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
Ecca Machine Corp., New York, N. Y.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., Cleveland, Ohio.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Malin & Co., Cleveland, Ohio.

WIRE—Non-Ferrous to Specification for Special Purposes
Anchor Wire Corp., Jamaica, N. Y.
Hudson Wire Co., Ossining, N. Y.
North American Philips Co., Inc., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Firth-Sterling Steel & Carbide Co., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH—Industrial
Roebling's John A., Sons Co., Trenton, N. J.

WIRE TESTERS—
Scott Testers, Inc., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARNS & TAPES—
Du Pont de Nemours, E. I., Co., Wilmington, Del.
Owens Corning Fiberglas Corp., Toledo, Ohio.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

Wire & Wire Products

November, 1947

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

AVAILABLE DESIGNS

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RIGID FRAME STRANDERS "RH" horizontal overhung spindle designs.

HIGH SPEED TUBULAR STRANDERS in over fifty sizes. Full tungsten carbide long radius guides — no guide sheaves.

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WATSON

MEASURING MACHINES for linear measurement in a variety of sizes and arrangements.

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LET-OFFS manual, mechanical, hydraulic lift types up to 110″ size.

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REWINDERS AND COILERS for warehouses and shipping rooms, power driven.

AUTOMATIC TRAVERSES in many sizes and arrangements suitable for mounting on older take-ups as replacements.

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POLISHERS centrifugal and spring pressure types.

TESTING MACHINES impact, torsion, bend and endurance units.

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REELS AND SPOOLS cast steel and fabricated designs for extremely heavy planetary and shipping duty.

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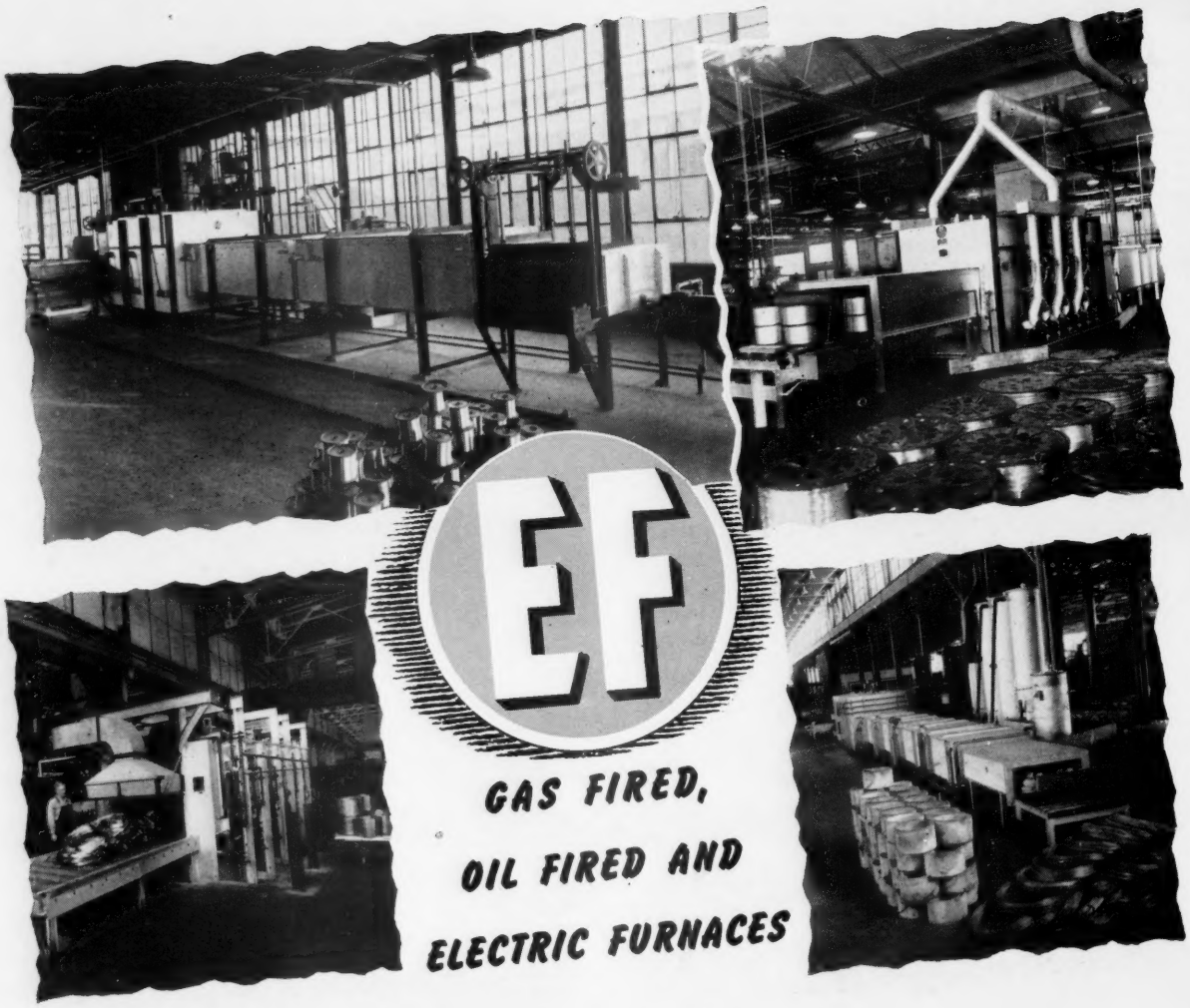

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